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LATEST TOP 20 DESKTOP AND MOBILE PCs

PC WORLD

July 1994 $3.95

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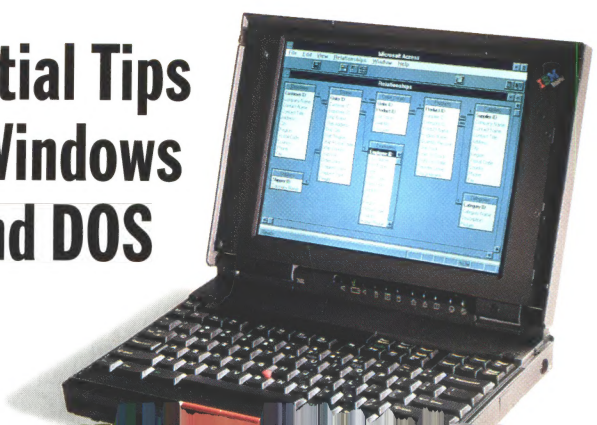

Putting it all together in one place.

You have a number of different jobs to accomplish. Every day. So your business software is key to putting together all the right answers.

Enter the new Microsoft® Office.

For the first time ever, individual programs work together like a single, insightful program.

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This power to work like one program springs from our unique innovations. Take OfficeLinks. Built with the integration standard, OLE 2.0, it lets you drag a chart from your spreadsheet and drop it into your word processor. Then automatically convert everything into presentation slides. Or create custom letters from your database of clients with just a click. All as if you're using one program.

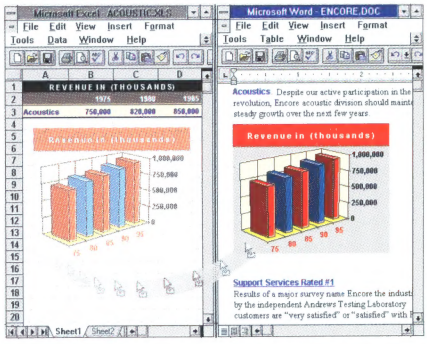
These programs even think the same. Their exclusive IntelliSense™ technology can sense what you need, then make everyday jobs like fixing typos happen automatically.

Together, they're so notably consistent in looks, actions and instincts, there's no question you'll think of them as one program.

And only the Microsoft Office combines it all with unlimited no-charge support. Microsoft just won the ITAA Quality Award* for that support. A singular distinction.

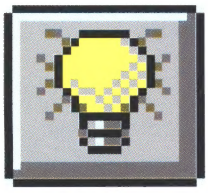
Of course all this "oneness" could only come from the most acclaimed, technically proficient individual programs around—Word, Microsoft Excel, PowerPoint® and Microsoft Access®.

We've barely scratched the surface here of what it means for all your programs to work together like one. You'll want to read the reviews



yourself, talk to people who use it, scout around at your nearest reseller. And by all means, call us at (800) 894-6642, Dept. LB8, to find out more. Any questions?

Microsoft® Office



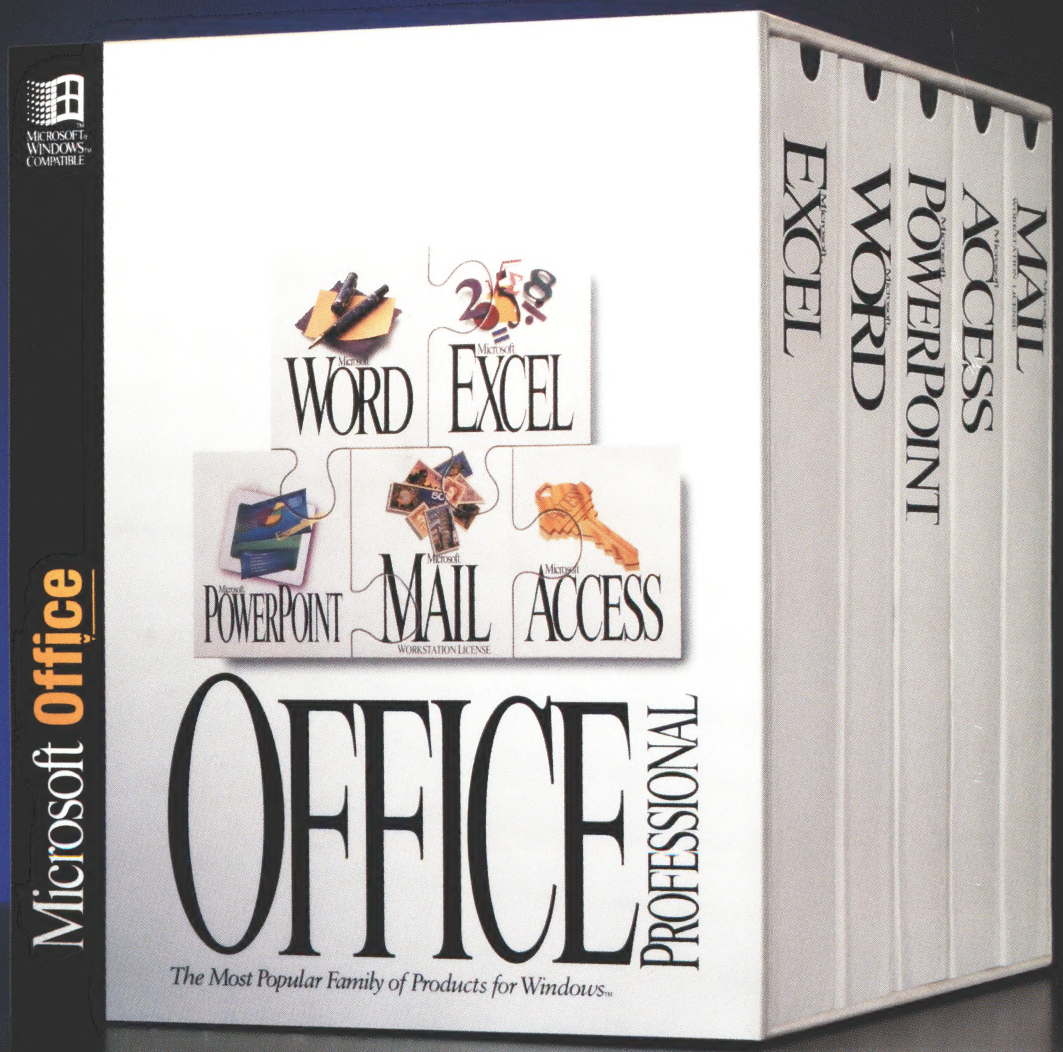
The TipWizard™ assistant in Microsoft Excel tracks the way you work and offers smart tips on how to save time.

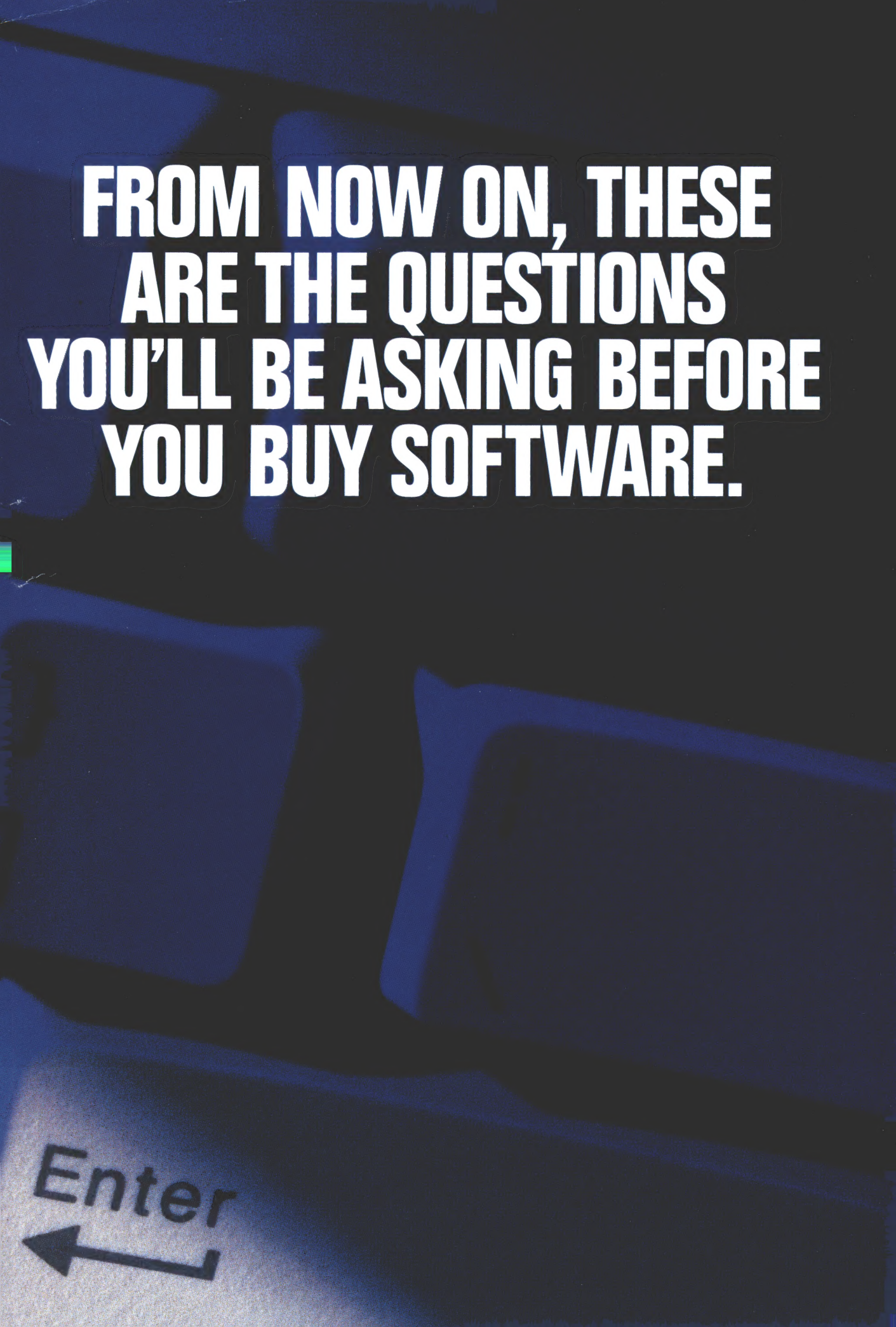
(Upper right) Just click a button on the Microsoft Office Manager (MOM) toolbar and your choice of first-rate programs pops into action.

(Lower right) Need to move information between programs? Just drag and drop it from one place to another. Then edit right in place.

*Awarded in 1993 by the Information Technology Association of America. Microsoft Office Professional, shown here, includes Microsoft Excel, Word, the PowerPoint presentation graphics program, the Microsoft Access database management system and a workstation license for Microsoft Mail (server and software acquired separately). © 1994 Microsoft Corporation. All rights reserved. In the 50 United States, call (800) 894-6642, Dept. LB8. In Canada, call (800) 563-9048. Outside the U.S. and Canada, call your local Microsoft subsidiary or (206) 936-8661. Customers who are deaf or hard of hearing can reach Microsoft text telephone (TT/TDD) services by calling (800) 892-5234 in the United States, or (905) 568-9641 in Canada. Microsoft, Microsoft Access and PowerPoint are registered trademarks and IntelliSense, TipWizard and the Windows logo are trademarks of Microsoft Corporation.

HERE'S WHERE YOU CAN FIND THE ANSWERS.




FROM NOW ON, THESE ARE THE QUESTIONS YOU'LL BE ASKING BEFORE YOU BUY SOFTWARE.
Enter

1. Do your programs work together intuitively as if they were all one program?

2. Can you simply drag text, data and graphics from one program and drop them into another?

3. Is your software intelligent? For instance, can it handle everyday tasks automatically?

4. Are your programs recognized as the best in their category?

5. Do your menus, toolbars and other elements look alike and work in the same easy way?

6. Do your programs have no-charge product support? For how long?

7. Ultimately, is it worth getting software that doesn't do all these things?

100MHz AT

IBM BLUE LIGHTNING

Your Windows™ apps need speed, while you need something to fit your budget.

Here's a solution that's a bolt from the blue: the D4100BL from AMBRA, an IBM subsidiary.

It takes advantage of IBM's Blue Lightning 100MHz processor. With clock-tripling technology, it boosts speed without heating up the price.

PC World named our 66MHz Blue Lightning a "Best Buy." Guess that makes our 100MHz an even *better* best buy.

You want one, you better get on the horn. They're going as fast as they run.

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Business Lease: $59/month

- ▲ 486 Blue Lightning 66MHz
- ▲ Upgradable to Pentium™ Technology
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- ▲ 4MB RAM, Max: 64MB
- ▲ 270MB Hard Disk Drive
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- ▲ VESA® Local Bus Graphics Accelerator 1MB
- ▲ 3 16-bit ISA and 2 32-bit VESA Bus Slots
- ▲ 3.5" 1.44MB Diskette Drive
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- ▲ 5 Drive Bays
- ▲ Lexmark™ 101-Key Keyboard
- ▲ MS-DOS® 6.2, Windows™ 3.1, Mouse

D4100BL $1999
Business Lease: $73/month

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- ▲ 3.5" 1.44MB Diskette Drive
- ▲ 5 Drive Bays
- ▲ Lexmark 101-Key Keyboard
- ▲ MS-DOS 6.2, Windows 3.1, Mouse
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- ▲ Parallel Port, ECP/EPP Supported

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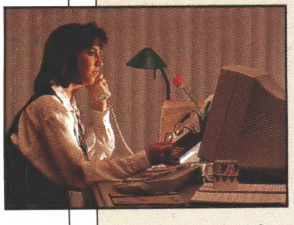

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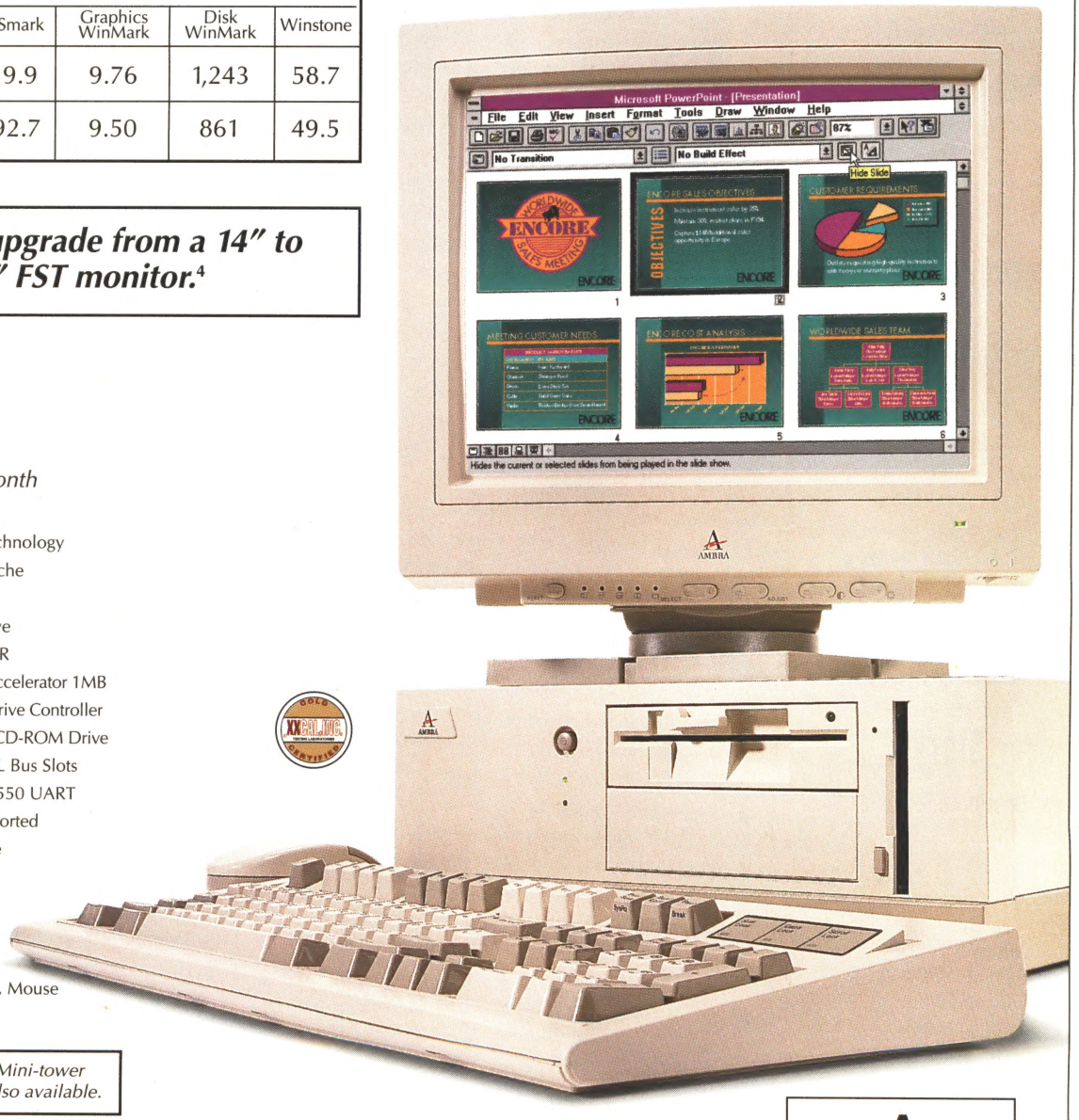
66MHz PRICES.

A BOLT FROM THE BLUE.

	Winbench 4.0			
	DOSmark	Graphics WinMark	Disk WinMark	Winstone
Blue Lightning 100MHz[2]	719.9	9.76	1,243	58.7
486DX2/66 Average[3]	592.7	9.50	861	49.5

Get a free upgrade from a 14″ to a 15″ FST monitor.[4]



4100BL $2399

usiness Lease: $87/month

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- 8MB RAM, Max: 64MB
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- VESA Local Bus Graphics Accelerator 1MB
- VESA Local Bus IDE Hard Drive Controller
- Double-Speed Multisession CD-ROM Drive
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- 5 Drive Bays
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- MS-DOS 6.2, Windows 3.1, Mouse

Desktop model shown. Mini-tower and other configurations also available.

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rantee, warranty and credit terms. Lease based on 36 months, offered by IBM Credit Corp. Onsite service may not be available in certain locations. Offerings y differ in Canada. Prices do not include shipping. Return shipping and insurance charges are the responsibility of the customer. [1]If purchased by 7/31/94. nbra results independently tested 3/31/94. [3]From PC Magazine, December 7, 1993. [4]Limited time offer expires 7/31/94. Applies to 60MHz or faster processors.

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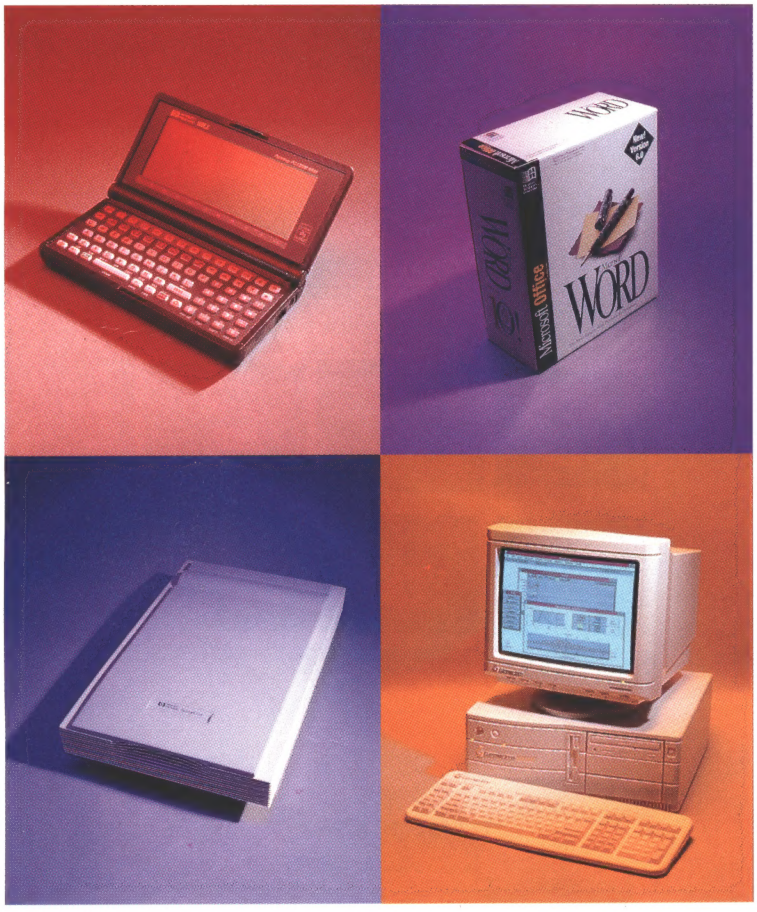

Cover Story

120 Best Products of 1994

Call it the ultimate buying guide. For our 1994 World Class awards, we polled 200 experts—from industry analysts to corporate buyers—and asked them to name the outstanding performers in 62 categories. From PCs to printers, CD ROMs to operating systems, these are the certified cream of the crop.

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Cover photography by Robert Cardin, digital composition by TX Unlimited/San Francisco

Scanners

135 Image In, Image Out

What used to be a pricey toy for graphics professionals is now mainstream business hardware. With color scanners priced as low as $700, you can jazz up a presentation or newsletter, create editable text from pages using OCR, or scan documents for your fax-modem. Our Best Buys are just the ticket.

Windows

152 80 Windows Tips...and a few for DOS too

Knowing you wish Windows were easier, faster, and customized to your needs, we've put together a collection of tips to end all tips. Plus, our Windows whizzes reveal their favorite utilities and show how they organize their own desktops.

Removable Drives

177 Drives With a Difference

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Reliability and Service Monitor

216 Win a 486DX2-66 PC
How satisfied are you with your PC? Have you had problems? Or is your PC trouble-free? Tell us about it! Fill out and fax in this month's survey for a chance to win a Gateway P4D-66, a Best Buy PC from this month's Top 20 charts.

New Products

89 Compaq Deskpro XL PC
90 ColorBook DX4-75 notebook
90 Double-Speed CD ROM Backpack parallel-port drive
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94 Phar Lap FrontRunner, Praxim, SmilerShell Pro 2.0 utilities
95 Super Show & Tell 1.1 multimedia presentation program
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100 Executor/DOS 1.2 Mac-emulation software
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102 WordPerfect Works 2.0 integrated software
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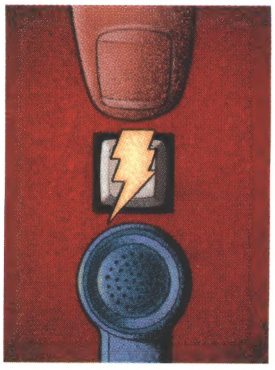
Here's How



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The ZEOS® Pantera™ Simply Can't

EXPERTS NAME THE ZEOS PANTERA #1

PC MAGAZINE EDITORS' CHOICE April 12, 1994 — PC Computing BEST May 1994 — PC WORLD BEST BUY June 1994 — Windows SOURCES EXPERTS' PICK June 1994

"The ZEOS Pantera 66 shoots to the top of our Power Desktop chart like a bullet. How did ZEOS pull off this feat in an arena crowded with Pentium™ contenders?" asked *PC World*. "For starters, this Pentium-66 is the fastest PC we've ever tested. It ran our benchmark suite over 20 percent faster than a typical Pentium-60 and over 60 percent faster than a typical DX2-66. That's a solid edge if you're looking for maximum power."

Top computer experts at *five* leading publications agree that the ZEOS Pantera is the best Pentium-processor based system available.

The Pantera earned:

- *PC Magazine* Editors' Choice (April 12, 1994)
- *Computer Shopper* "top choice" (April 1994)
- *PC/Computing* BEST (May 1994)
- *PC World* Best Buy (June 1994)
- *Windows Sources* Experts' Pick (June 1994).

These prestigious awards all add up to one thing–ZEOS computers are your #1 choice.

Don't settle for less. The ZEOS Pantera has it all. *PC/Computing* concurs: "Hot performance, room for expandability, and a low price make this system our top choice."

POWER BEYOND POWER

"At the top is the new ZEOS Pantera 66, a Pentium-66 that recorded the fastest benchmark results ever to come out of the PC World Test Center," *PC World* reported.

PC Magazine said: "ZEOS Pantera-66 combines quality features, good price, and high performance.... A consistently above-average performer on all our benchmark tests...."

The ZEOS Pantera received the highest marks on many benchmark tests including the important Graphics WinMark and Disk WinMark tests run by *PC Magazine*. In fact, its Disk WinMark surpassed the next closest competitor by 35 percent!

What makes the Pantera fly at supersonic speeds? A ZEOS designed motherboard with exceptional features such as a hot new integrated PCI Local Bus IDE Controller (supporting up to four IDE devices) that, as *PC Magazine* said, "pushes disk access into new territory."

PENTIUM & 486 PANTERAS

Even better, we now incorporate the latest award-winning Pantera technology (including PCI) to our 486 PCs. The new 486 Panteras are the 486 answer to both the value-minded and power-hungry user. There's a package right for you, or we'll custom configure one to your exact needs!

The expanded Pantera line includes more processors–from a 486SX-25 to a DX4-100 all the way to a Pentium-90! These new, improved and even more affordable systems feature local bus IDE hard drives from 214MB to 1GB; memory from 4MB to 24MB; a new 64-bit video controller; 3 PCI slots (one contains our PCI local bus video card) in addition to 5 ISA slots; and on-board Fast SCSI-2 option. And all Pantera systems are 100% compatible with every major network operating system on the market.

yes It runs with NetWare

ALL THE EXTRAS INCLUDED

The best news: We give you all this at a marvelous price. There's no doubt about it. *PC/Computing* said: "We suggest you spend your money on this machine–it offers the best value of any system we tested." *Windows Sources* agrees: "ZEOS Pantera offers the best performance for the price."

PC MAGAZINE SERVICE & RELIABILITY READERS' CHOICE

And the value doesn't stop with your purchase. You get the best service and support in the business. In fact, ZEOS has won more *PC Magazine* Readers' Choice for Service & Reliability awards than any other company–five in all. We were the first to provide 24-hour toll-free technical support–every day!

ZEOS offers you all this and more. It's easy to see why the Pantera is the "number one power desktop Best Buy." It's the Editors' Choice. Make it your choice. As *PC/Computing* said, "there's no doubt which machine you should choose: ZEOS's Pantera...this is a deal you simply can't pass up." Call your ZEOS Systems Consultant now at 800-554-5220.

"This Is A Deal You Pass Up." —*PC/Computing* BEST, May 1994

PROCESSORS	PACKAGE 1	PACKAGE 2	PACKAGE 3	PACKAGE 4
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486DX-33	$1645 Lease $60/mo.	$1945 Lease $70/mo.	$2345 Lease $85/mo.	$2945 Lease $107/mo.
486DX2-66	$1795 Lease $65/mo.	$2095 Lease $76/mo.	$2495 Lease $90/mo.	$3095 Lease $102/mo.
DX4-100	$2095 Lease $76/mo.	$2395 Lease $87/mo.	$2795 Lease $101/mo.	$3395 Lease $112/mo.
PENTIUM-66	$2395 Lease $87/mo.	$2695 Lease $98/mo.	$3095 Lease $102/mo.	$3695 Lease $122/mo.
PENTIUM-90	$2595 Lease $94/mo.	$2895 Lease $105/mo.	$3295 Lease $109/mo.	$3895 Lease $129/mo.
More processors available. Call for details.	■ 4MB RAM	■ 8MB RAM	■ 16MB RAM	■ 24MB RAM
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■ PCI local bus color graphics card upgradable to 2MB.	■ 64-bit Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM	■ 64-bit Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM	■ 64-bit Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM	■ 64-bit Windows-accelerated PCI local bus SVGA color graphics card with 1MB RAM
■ Two high-speed serial ports and one enhanced parallel port.	■ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch	■ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch
■ Three PCI slots and five ISA slots.	■ Six-bay desktop case with two cooling fans	■ Six-bay desktop case with two cooling fans	■ Six-bay desktop case with two cooling fans	■ Six-bay desktop case with two cooling fans
■ Optional on-board Fast SCSI-2 socket.	■ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse	■ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse	■ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse	■ MS-DOS 6.2, Windows for Workgroups 3.11, Microsoft Mouse
■ Flash BIOS.			■ Choice of Lotus Windows application	■ Choice of Lotus Windows application
■ 200 watt power supply with built-in surge suppressor. Switchable between 115/230V.				
■ ZEOS 101-key space-saving keyboard.				
■ FCC Certified Class B; UL Listed.				
■ Complete ZEOS Customer Satisfaction Package.				

PENTIUM EXTRAS:
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486 EXTRAS:
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- 25MHz 386SL or 486SL Intel microprocessor.
- RAM expandable to 8MB (486SL) or 10MB (386SL).
- 486SL: IDE hard drive upgradable to 120MB.
- Display: 640 x 480 VGA backlit, .23 dot pitch. Sharp 7.4" diag., up to 64 gray shades.
- 256K (386SL) or 512K (486SL) video RAM.
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- Supports simultaneous display with an external SVGA color monitor.
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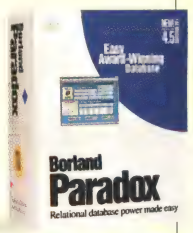

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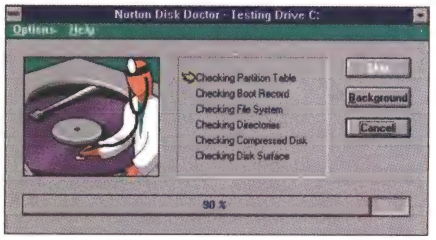

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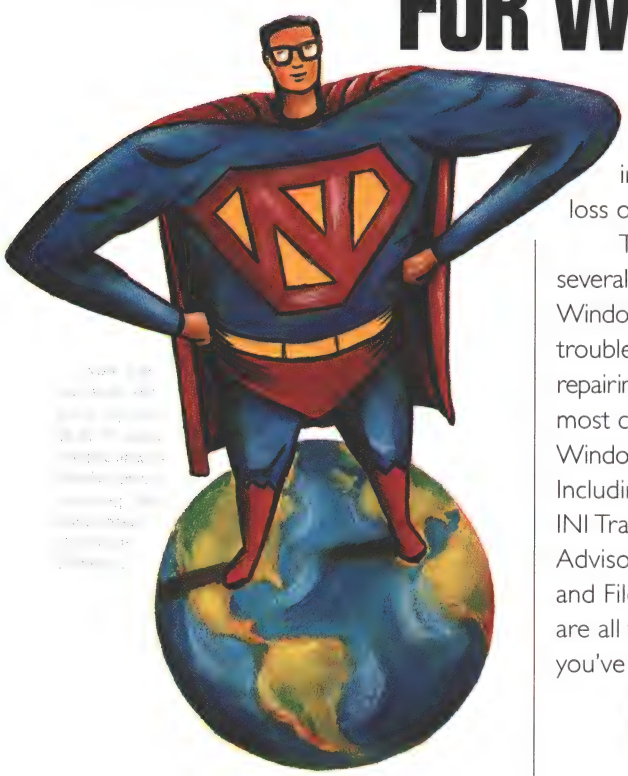

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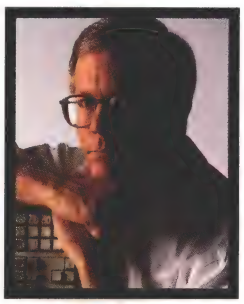

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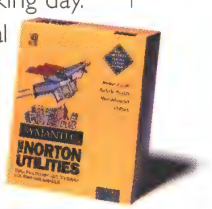

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World Class, Then and Now

Last December, we presented our 1993 World Class Award winners—our readers' picks for the best PC products of the year. At the same time, the *PC World* staff looked ahead and selected ten newly released products that pointed toward trends for 1994.

In this issue, we announce the 1994 World Class winners—an outstanding group of products chosen by 200 PC experts. Do these award winners reflect any of the trends we pointed out seven months ago? And just what happened to the ten trendsetters we selected?

1. Compaq Presario 425. In December, we praised this innovative all-in-one PC for its ease of setup and its suitability for home offices. And indeed, the 425 has met with high demand in homes across the country. But today, in the fast-moving PC market, more versatile Presarios are available. Especially if you're interested in multimedia, consider instead Compaq's newer Presario 633 or 800 CDS PCs with CD ROM drives.

2. Arabesque Ecco. Last year, we echoed Arabesque's labeling of Ecco as "Super-PIM." This year, it grabbed top World Class honors, ahead of former winner Lotus Organizer. What gives Ecco the edge? Its flexible outliner, which lets you organize information the way *you* choose—essential for managing idiosyncratic, personal information.

3. IBM PS/2 E. When this PC debuted, we heralded it as a breakthrough. Many PCs now incorporate energy-efficient features, but the PS/2 E is still the most energy efficient by far. However, it's expensive, and people buy energy-conserving PCs to save money. As prices for 3.3-volt CPUs and other parts fall, this product needs a big price cut.

4. Canon NoteJet 486. This notebook PC with a built-in printer tackles the annoying problem of printing on the road. So why aren't more road warriors buying it? Limited distribution, for one thing. Canon is now increasing distribution and introducing two new lines of NoteJets. We'll review them in an upcoming issue to see if their performance, price, and printing prowess tip the scales in their favor.

5. Kiplinger's CA-Simply Money. We were impressed by Simply Money's initial price—free, or the closest thing to it: $6.95 for shipping and handling. We also liked the way it couples money management with financial advice from the *Kiplinger Letter.* It seems that Intuit, maker of this year's winner, Quicken, liked the idea, too. Now out on CD ROM, Quicken adds financial advice with a series of interactive articles and full-motion video.

6. Tandy Zoomer. Here's what we said last year about the Zoomer and other personal digital assistants: "...don't be surprised to see a host of these palm-size wonders on next year's list." The Zoomer didn't come near World Class status this year. But the Apple Newton—the Zoomer's notorious competitor—ties with Hewlett-Packard's keyboard-equipped HP100LX for an award. Each has trade-offs, neither is a wonder, and we eagerly await next year's winner. Already, a new Newton is shipping, and Bell South is remarketing the older one as the pager for the rest of us.

7. Asymetrix Compel. This package's forte is multimedia presentations, complete with voice, audio, and video. Compel's presentations still outpace the rest of the pack's, but putting them together is less than straightforward. The award goes to Lotus Freelance, which is exceptionally easy to use. Watch for a simpler version of Compel with an outliner and more templates.

8, 9. Aldus IntelliDraw and Shapeware Visio. We cited both draw packages for redefining ease of use, largely due to their templates and drag-and-drop drawing. Neither is up for an award this year, but Visio, in particular, still points toward the future. Recently released in an OLE 2.0 version that plugs into Microsoft Office, Visio Express is the first scaled-down, object-based mini-application, or *component.* Look for more component applications, especially for office suites, as the year progresses.

10. Fractal Design Painter 2.0. Why did we choose an image editing package as a harbinger of things to come? Again, an innovative use of objects. Painter was one of the first image packages to use object layering, making it possible to easily accomplish editing tasks once out of reach for most desktop PC users. Object layering is now built in to other image packages, including Micrografx Picture Publisher. It's conspicuously absent, though, from Adobe Photoshop, winner of this year's award. Adobe, is an upgrade in the works?

The Most Promising Newcomer this year? The PowerPC. Its challenge is to unseat the Pentium next year as Product of the Year.

One last note: Last year, our readers chose Intel's Pentium as Most Promising Newcomer. This year, the Pentium fulfills that promise, garnering our first-ever Product of the Year award.

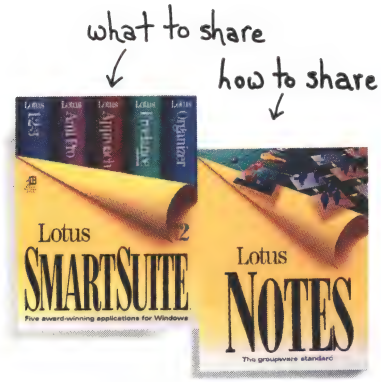
The Most Promising Newcomer this year? Apple/IBM/Motorola's PowerPC. Its unenviable challenge is to unseat the Pentium as next year's Product of the Year. We wish it well.

For a look at more 1994 World Class winners, see page 120.

Cathryn Baskin, Editor

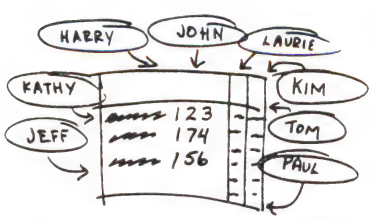
O.K., you've got your own personal vision. And this other guy, he's got his own personal vision. And so does everyone else in your workgroup.

Well, we've got these five software products that work like one and let you and your colleagues and co-workers and people you haven't ever even me do the same. Hey, find the right way to work together, there's no telling what you can do.



Even though sometimes it seems like you're in it alone, you know that you rely on the people around you and that ultimately nothing gets done without teamwork. So it makes sense that your software should help this process, not stand in the way.

That's why Lotus® SmartSuite® is designed for workgroups, not just individuals. SmartSuite is five Windows™ applications–1-2-3,® Ami Pro® word processor, Approach® database, Organizer™ personal information manager and Freelance Graphics®–fully integrated to work together, and enabled with powerful workgroup features to help co-workers do the same.



Version Manager technology lets many people work on the same document. Add Notes and they can do it at the same time.

For starters, each application shares a consistent look and feel. Everything works the way you expect it to, so if you've learned one application, you won't spend a lot of time learning the others.

Smarter than the other suites

SmartSuite has many productivity features you just can't get anywhere else. Like Collect and Copy which lets you take multiple data ranges from any number of 1-2-3 spreadsheets and bring them into an Ami Pro document with a single click, setting up a live OLE link at the same time.

Lotus SmartSuite moves beyond integrating applications to integrating workgroups through built-in technologies like Version Manager™ which lets workgroup members work on

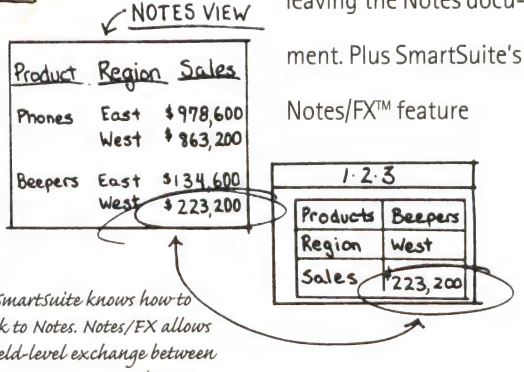
*$299 promotional price available while supplies last. **In Canada call **1-800-GO-LOTUS**. Prices may vary. ©1994 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, Working Together, 1-2-3,

the same file concurrently,
adding their insight without creating confusion.

Notes takes it to the next level

And to really experience the power of Working Together,® combine SmartSuite with Notes,® the groundbreaking groupware from Lotus. Right now almost 750,000 people in more than 3,000 companies are using Notes to access, track and share data in ways never before possible.

Now you can harness the power of SmartSuite's individual applications from within Notes, using 1-2-3's power to crunch numbers, Ami Pro's facility with words or Freelance Graphics' presentation capabilities – without leaving the Notes document. Plus SmartSuite's Notes/FX™ feature automates the exchange of information between the desktop apps and Lotus Notes. The bottom line is a better level of communication – more complete and more accurate than ever before.



SmartSuite knows how to talk to Notes. Notes/FX allows a field-level exchange between SmartSuite apps and Notes.

Look into SmartSuite. A SmartSuite upgrade costs **$299.*** Just call **1-800-TRADE-UP, ext. 9699.**** The time you save will be your own.

Lotus
Working Together®

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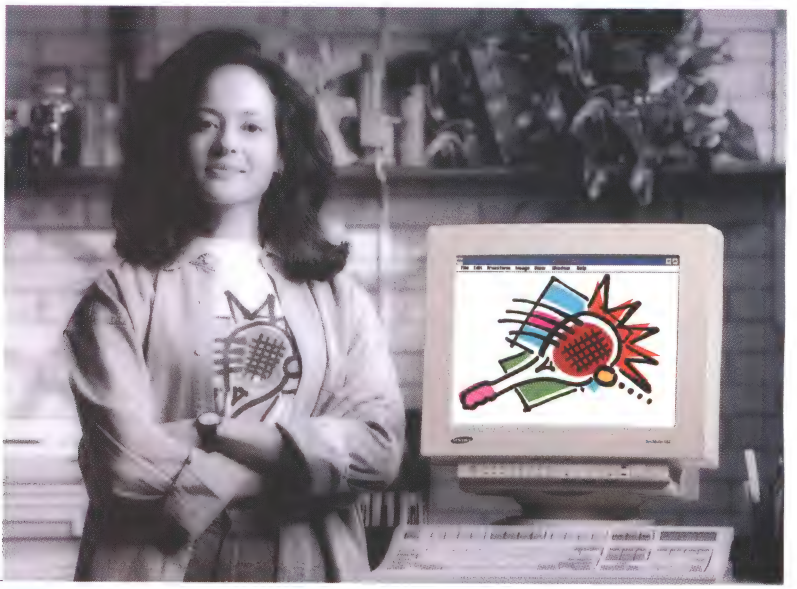
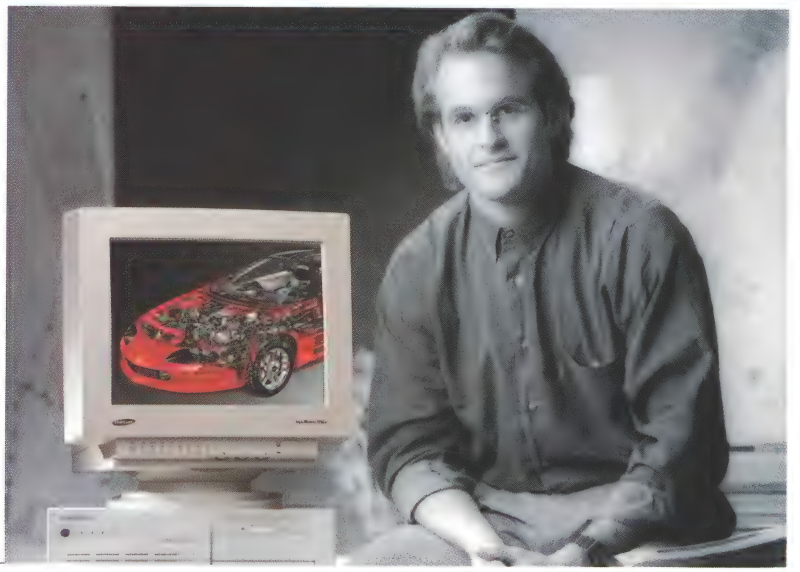
Samsung
A new point of view.



SyncMaster 17GL



SyncMaster 17GLs

It's about how you work...Attitude. Satisfaction. Pride. The 17-inch SyncMaster™ monitors reflect today's changing lifestyles. Hassle-free. Value-oriented.

Samsung took for granted you wanted bright, crisp clear images that don't flicker. You're also concerned about safety and energy conservation, so they're standard on the whole series.

Life should be as simple as possible, so we added innovative new features like On-Screen Display and Real Color Control, and as you would expect, the GL Series comes with a two-year limited warranty.

Think about how you view your work. Samsung did. And came up with a whole new point of view.

TECHNOLOGY THAT WORKS FOR LIFE

SAMSUNG ELECTRONICS

SyncMaster	14GL	15GL	17GL	17GLs
Size	14"	15"	17"	17"
Dot Pitch	.28	.28	.28	.26
Maximum Resolution	1024x768	1024x768	1280x1024	1600x1280
Maximum Refresh Rate at Maximum Res. (Hz)	76	76	60	60
MPR-II (Low Radiation)	•	•	•	•
Power Management	•	•	•	•
Flat Square Screen		•	•	•
On-Screen Programming			•	•
Real Color Control				•
Warranty	2 Years	2 Years	2 Years	2 Years

*1994 Samsung Electronics America Inc. The EPA Energy Star Logo is not to be considered a product endorsement. Image on SyncMaster 17GL courtesy of Mike Quon Design. Image on SyncMaster 17GLs courtesy of David Kimble.

Sharing the PC Wealth, CD ROM Runs Amok

Donations Gratefully Accepted

I read Bob Vrbka's comments in April's *Letters* ["Reading, Writing, and Number Crunching"] with dismay. He says "schools don't want your XTs, 286s, Commodores, or TRS 80s." Says who?

I'm a clinical neuropsychologist at the Head Trauma Program at the Rusk Institute of Rehabilitation Medicine in New York, a rehabilitative program for people with traumatic brain injuries. Our students would be grateful for usable donated equipment to run our cognitive training package—even an old 8088 without a hard drive. In this day of rapid upgrades and "throwaway" hardware, many educational programs could use *any* donated equipment, not just fancy state-of-the-art hardware.
Ronald P. Baumanis, New York

Recycled Hardware

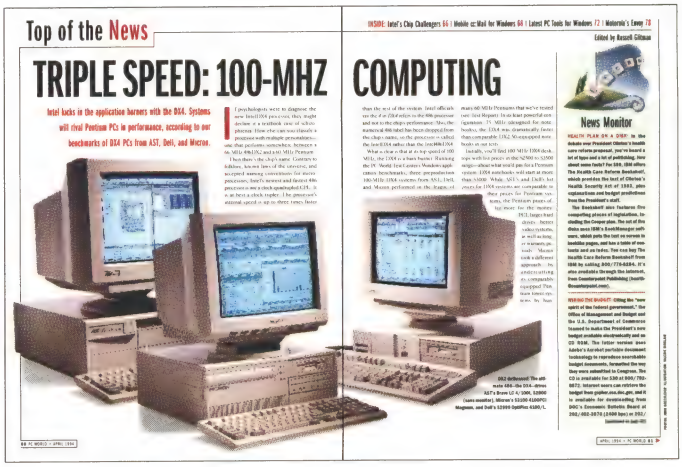
Due to your coverage of programs for donating computers, I have been repairing donated computers for the past year. The machines are then given to local elementary schools. The children, teachers, and I have expressed our heartfelt thanks to businesses and individuals who have donated used PCs.

If any readers are considering donating an older model or a broken computer to enhance education, please don't let Mr. Vrbka's opinion in April *Letters* dissuade you. Hardware and software change constantly, and by the time a student enters the job market, just about everything is outdated. But that same student will have benefited from your donation by acquiring a basic understanding of computer equipment.
Richard A. Lazik,
Summerville, South Carolina

Any 286 in a Storm

Even as I write this, my monitor is giving out, my hard disk is blown, and my 8086 is hanging up too often. I'm a struggling young hacker trying to write some programs so one day I can buy a Pentium (*fireworks, angels singing*) and program some really cool stuff.

The other day I read in *PC World* that 286s were not worth passing along. It struck me that I could use a 286. If anyone out there doesn't want theirs, I will gladly give it a good home. Send me any old PC you can. No toasters, please! I'd better hurry up and print this, before she blows...
Frankie Carle,
Warren, New Jersey


Top of the News

TRIPLE SPEED: 100-MHZ COMPUTING

Intel kicks in the application burners with the DX4. Systems will rival Pentium PCs in performance, according to our benchmarks of DX4 PCs from AST, Dell, and Micron.

News Monitor

Savvy on Systems

Thanks for your April systems coverage. I was leaning toward buying a Toshiba or NEC portable until I heard that those companies were releasing models with the DX4-75. I had to decide whether to buy what was available or wait a few weeks and spend a lot more for a new model. "Triple Speed: 100-MHz Computing" [*Top of the News*] helped me decide.

Your advice on page 124 ["Buying Smart: Consumer Tips"] to call vendors near the end of the week or month, when sales reps are trying to make their quotas, saved me money. Some vendors stuck to the original price, but others wanted to know how low they had to go to interest me. One sales rep admitted I had found her soft spot because it was the end of the month, just like you said.
Bruce Einspahr, Pasco, Washington

Playing the Multimedia Game

Thanks for David Coursey's article "sex, lies, and multimedia" [*Inside Source,* April]. I had begun to think I was the only one who found it significantly inconvenient to fulfill all the requirements of multimedia programs.

The following is just one example of my CD ROM experiences. I bought and installed Myst recently in hopes of a fun game and great graphics. After half an hour, it locked up. After an hour of trying to fix the problem, I gave up.

When I called Broderbund, the company put me on hold for 10 minutes, then recommended calling the makers of my sound card, video card, and CD ROM drive and getting the most recent drivers. I had to log some more long-distance time to obtain the drivers from bulletin boards.

I still want to play the game, but my margin of satisfaction is rapidly shrinking. On top of the price of the game is the cost of long-distance phone calls, plus the time and aggravation of getting everything to work together.

I agree with Coursey's statement that more drivers should come with the CD. Silly me—I thought that the company would want to make its game playable on my machine rather than expect me to rework my system to play its game.
Derick Kopff, Montclair, New Jersey

Name the Culprits

I get angry when I read articles like "sex, lies, and multimedia." What's the purpose of moaning and complaining about "some" CD ROM products without bothering to tell us who the offenders are? Name names!
Barry E. Becker, Smithtown, New York

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BRAVO LC *Intel DX4/100,486DX2/66, 486SX2/50, 486SX/33, 4 ISA slots including 1VL slot, 5 drive bays, Pentium OverDrive upgradable.* **BRAVO LP** *Intel 486DX2/66, 486SX2/50, 486SX/33, 2 ISA slots, 3 drive bays, Pentium OverDrive upgradable.*

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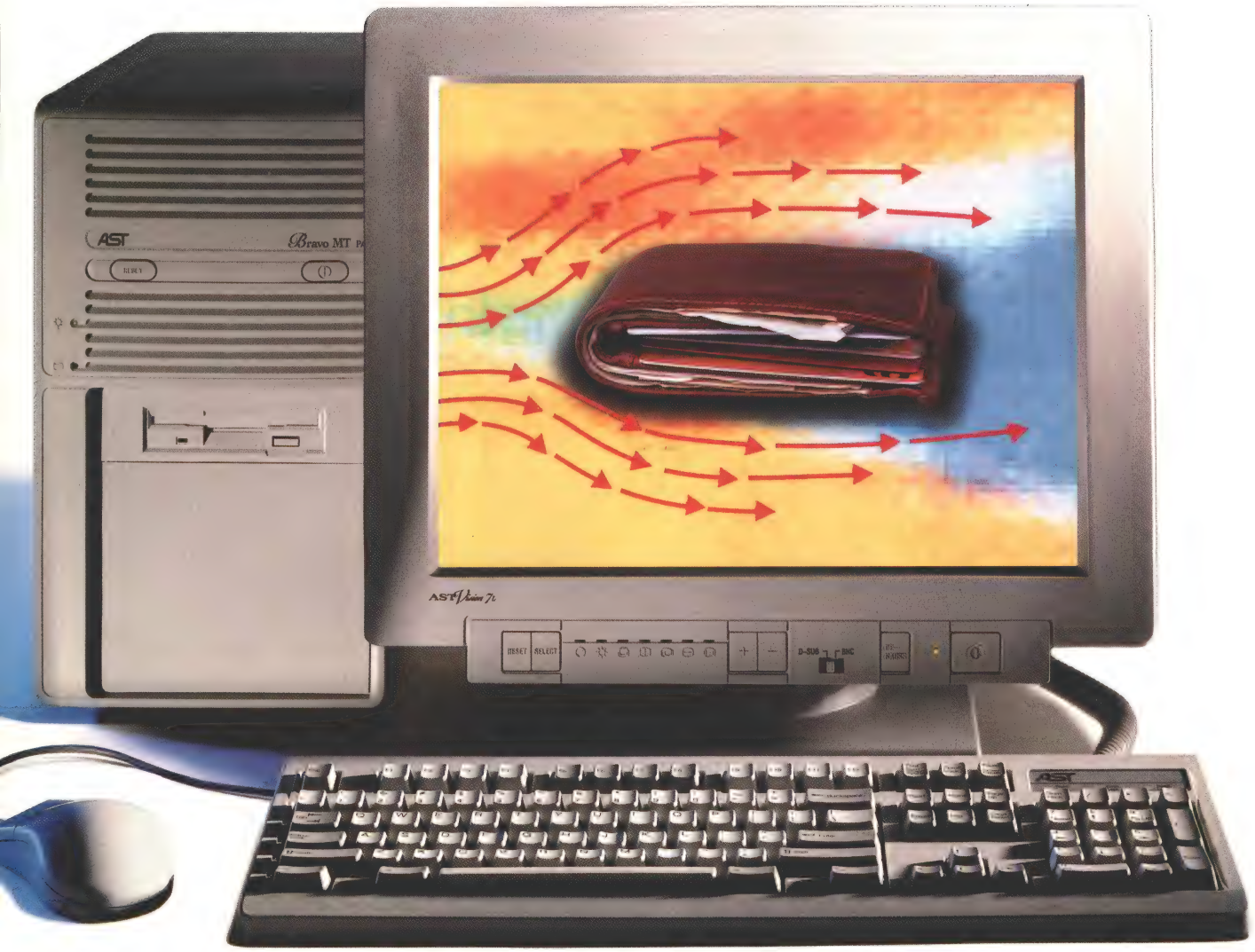

BRAVO MT *Intel Pentium 60MHz, 486DX2/66, 486SX2/50, 486SX/33, 6 ISA slots, 6 drive bays, FlashBIOS. Pentium 60MHz includes 5 ISA and 2 VL slots.*

to Intel's Pentium OverDrive™ processor.

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Another View of ViewMagic

In "The Big Picture: 17-Inch Monitors" [April], your review of the ETC ViewMagic CA-1765 monitor was incomplete. The author complains about its display at 800 by 600 yet fails to note that monitors' performance depends partly on the graphics card used. ETC Computers tries to guard against problems by extensively testing popular graphics cards, but some cards provide less than perfect results. You would have better served readers by running tests using a variety of graphics boards.

I also disagree with your complaint about our monitor's on-screen controls. Users don't have to "race to input settings within a 3-second time frame before the controls [vanish]." Controls remain visible as long as the user makes adjustments, disappearing after 3 seconds without input.

Finally, in regard to the author's comment that the ViewMagic's screen looked "washed out," users must understand that a brighter screen will consume more energy and shorten the CRT's life. In addition, extremely bright screens are recognized as a source of eyestrain. Our monitor balances the need for a crisp image with the realities of working long hours in front of the display. *Kent Huang, president, ETC Computers*

Editor's response: As Huang points out, monitors and graphics boards have a complex relationship. Different boards use different signals and frequencies to drive monitors, so a monitor may perform well with one board and poorly with another. We used the Genoa Phantom 32i VL bus board in our tests because it met our performance needs, is based on industry-standard technology, and is widely available. We agree that testing with several boards is a better way to rate overall performance; however, of the monitors reviewed, only the ViewMagic failed to fill the screen at all resolutions.

Regarding on-screen controls, author TJ Byers considered a 3-second interval too short to allow users to review settings, although this issue is a matter of personal preference. *—Michael Desmond*

Pagination Secrets

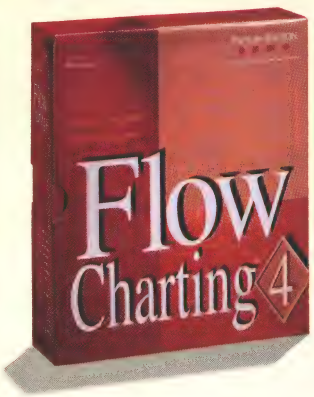
In my 65 years on this earth, I have seen the birth of many modern marvels. The one I am still waiting for with bated breath is the numbering of all pages in magazines. It is a skill that has eluded the vast majority of publishers and makes my search for particular ads frustrating. Every month I wonder again why magazines deprive me of this seemingly simple convenience.

A single sentence or two could clear up the mystery for me. Live long and prosper. *Willi Wald, Hamilton, Ontario*

Editor's response: Most magazines omit page numbers from advertisements because most advertisers prefer it that way, and they're paying for the ad pages.

Support Worth Paying For

There's been a great deal of flap in the PC mags about the death of free support ["The End of Free Support," March]. You get what you pay for. When a word processor cost $400 to $500, I expected free help. Now that the major players offer suites with several components for the price of one, and the profit margins are razor thin, it's hard to continue to expect to pay nothing



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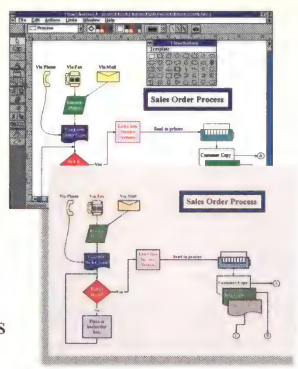

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So come on, find out what all the critics have been raving about. Visit your nearest authorized ALR reseller, and take a look at the new ALR Express and our complete family of award-winning systems and multimedia solutions. For the reseller nearest you call today:

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Circle 9 on reader service card

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for support. As long as vendors hold up their end of the bargain and provide well-trained people at the other end of the line, I don't mind paying. But if I pay for support, I want it to be good. Over time, those vendors who charge for inadequate support should be drummed out of business.
Betsy Getreu, PC World Online

Busted

This is too good to pass up. Page 65 of your April issue says, "You can expect prices for double-speed CD ROM drives to fall below $200 this year." Same issue, page 242: "Ready to upgrade to multimedia? It's never been cheaper, with double-speed drives priced from $188..." The only possible explanation is that you were trying to see how many readers read both articles!
Tony Lima, San Carlos, California

Editor's response: List prices are expected to fall below $200 this year, whereas street prices are lower. Sorry we didn't make the distinction clear.

Corrections and Clarifications

The article "Hold the Next Meeting at Your Desk" (*New Products*, March) said TalkShow 2.0 connects only two modems simultaneously. In fact, it allows a multipoint conference with several modems. *PC World* regrets the error.

Letters *welcomes your responses and ideas.* *See page 12 for contact information.*

AND THE WINNER IS...

PC World congratulates the following readers, who won prize systems when their returned Reliability and Service Monitor surveys were selected at random:

- Yoshiko Cardin, October 1993 winner of an NEC Image 466
- Peter Brule, November 1993 winner of a Diamond DT 486DX2-66
- Jerry Bartel, December 1993 winner of a Polywell Poly 4586VR
- Howard Williams, December 1993 SOHO section winner of a Compaq Presario 486 PC
- Jon Simborg, January 1994 winner of a Gateway 4DX2-66V

We've always tried to be the best. *Are we there yet?*

Confucius taught that humility is the measure of a man. We say perfection *is the measure of a disk drive.*

It's not really our place to say. But if we were willing to say it, how would we substantiate it? First we'd tell you about our *730 MBs* and *1 Gigabyte* drives, new additions to an already complete line. And we'd mention that all our drives now come equipped with *Enhanced IDE*. We'd tell you that our drives undergo rigorous testing. And about our *three-year warranty*. But that's all we'd say. Not that we couldn't say more. But we'd prefer to quietly keep making our drives better and better. See the line next to our logo. We really do mean that.

THIS IS OUR PRODUCT AND THIS IS WHY IT'S SO GOOD. *We have a complete family of drives, ranging from 210 MBs to 1 Gigabyte. All of our drives have Enhanced IDE. All come with a THREE-YEAR warranty. And they've even won all the awards below.*

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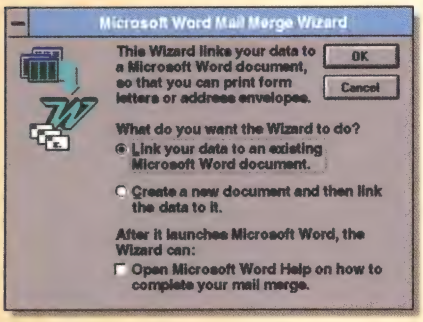
Office Professional includes: Microsoft Excel, Word, PowerPoint, Microsoft Access, and a workstation license for Mail (Mail server and software acquired separately). In the 50 United States, call (800) 370-8996, Dept. CN3. For info only: In Canada, call (800) 563-904

They say you can't be all things to all people. But one database comes really close: new Microsoft Access® database management system 2.0. The first relational database for everyone.



Mail Merge Wizard works directly with Microsoft Word to place your selected data into the document of your choice.

If you need a database with a small "d," you've found it. Microsoft Access is easy to use. So easy, you can create tables, make forms, and print reports right from the start.

Want that capital "D" variety? Then fasten your seat belts.

Microsoft Access packs speed, power, and control. Helping database developers quickly create sophisticated database applications.

The fact is, Microsoft Access has something for everyone. Or more precisely, a lot for everyone.

Like new Rushmore™ query optimization, a technology that makes queries lightning fast. So you get your data quicker.

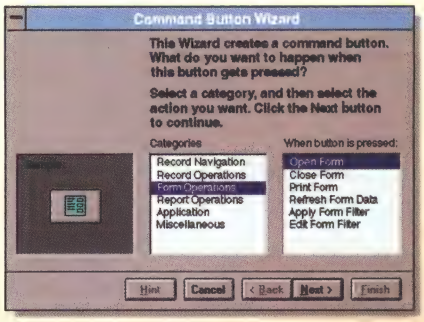
Like Table Wizard, a feature that takes you step-by-step through table setup and design.

Like Query Wizard, a helpful assistant who walks you through the steps of finding your data.

In fact, thanks to IntelliSense™ technology, a Microsoft Office feature, many of your routine tasks will be automatic. And your complex tasks become much easier.

Of course, when you're ready to venture beyond the basics, Microsoft Access is, too. With tools that help you develop powerful database applications. Including engine-level validation guaranteed to keep your data safe.

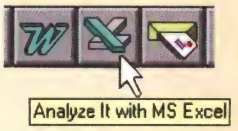
And a programming language featuring an event model for added control and flexibility similar to Microsoft® Visual Basic® programming system.



Add fully functional buttons to a form using the Button Wizard. Microsoft Access does all the work of writing the code behind the button.

Microsoft Access even makes it easy to tap into any current database you have, from Paradox® to Microsoft SQL Server.

You can also count on unlimited no-charge product support by phone (toll charges may apply).



With OfficeLinks, send data directly to Microsoft Excel using the Analyze It toolbar button.

And for as little as $99* for an upgrade or $359* for the Office Professional upgrade, Microsoft Access couldn't be more, well, accessible. For a reseller's name, or to order, call 800-370-8996, Dept. CN3.

Microsoft Office

*ess qualify for $40 rebate upon acquiring Office Professional 4.3 ($399 upgrade SRP). Plus applicable sales tax. Reseller prices may vary. Offer good until August 31, 1994 and only in the 50 United States. © 1994 Microsoft Corp. All rights reserved. Microsoft tside the 50 United States & Canada, call your local Microsoft subsidiary or (206) 936-8661. Microsoft, Microsoft Access, PowerPoint, Visual Basic and the Windows logo are registered trademarks and IntelliSense and Rushmore are trademarks of Microsoft Corp.

Buying a New PC? Ask These Questions First

Buying a computer is a lot like buying a car. Ten different people can buy the same make and model, but drive away with very different deals. Why? Partly luck. It can help, for example, if you stumble upon a salesperson desperate to meet a quota. But it's also a matter of knowing what questions to ask, and not being too shy to ask them.

I should know. I just bought a new PC. It took me two months. Two *loooong* months, when I spent nights and weekends making phone calls, comparing configurations, and driving from store to store in search of the perfect deal. After a couple of false starts, I got into a groove. I'd ask each salesperson a handful of key questions. Several couldn't get past the first few items on my list, others breezed through their answers with no problem.

In the end, I found a computer I liked at a price I could afford. I also discovered that a few well-placed questions go a long way. Here's the list of questions I asked—or wished I had.

1. Can I bring the PC back for an unconditional refund? Some salespeople cringed at this question, perhaps worried that I'd use the computer for a special project, then return it to the store. But just about every store offered a refund. The exceptions were local storefront dealers who didn't sell enough computers to support such returns.

2. Do you offer price protection? There's no good time to buy a PC. If your luck is like mine, the minute you sign your credit card receipt Intel will drop the price on its Pentium chip, starting a free-fall in the rest of the industry. You don't have to be caught off guard, though. Ask salesclerks whether they will match or beat lower prices found elsewhere, and for how long after purchase the price guarantee holds. (Note: These price-protection guarantees were started by home appliance stores and typically apply only to identical products. They don't cover custom-built PCs or store brands.)

Regardless of what type of PC you're buying, ask what happens if prices drop dramatically or a better chip is introduced within 30 days after you get your system. An associate of mine was able to get a free upgrade to a 66-MHz Pentium, for example, since he received his 60-MHz model just after the faster versions were introduced.

3. Is that your final price? Not every store or mail-order company will cut you a deal on prices, but ask anyway. I found that stores like Price Club, Costco, and Circuit City wouldn't drop the price at all, but both local dealers and superstores were willing to bargain. For their part, many mail-order firms are known for cutting great deals at the end of the week and the end of the month, as well as for matching or beating their competitors' prices.

It's not easy to start the "let's make a deal" conversation. A lot of people feel uncomfortable asking for a lower price—after all, no one likes to seem cheap. Still, I put aside my embarrassment and was pleasantly surprised at the results. The local dealer threw in the case, DOS, and Windows (worth roughly $150), and CompUSA dropped the price by $70. The lesson? Don't blindly accept the price you're quoted.

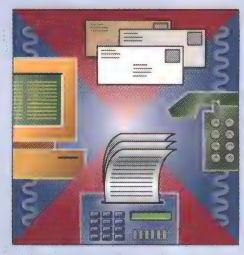
4. What do you charge for assembling the system? If you have a PC built from scratch—whether at a superstore, a mail-order firm, or a local storefront dealer—make sure you ask this question. And one word of advice: It's not always called an assembly fee. The CompUSA store I visited, for example, hid the $29 assembly charge within a $79 fee that's listed on the invoice as an "on-site warranty." The salesclerk never asked if I wanted on-site service. (I didn't.) Had I not asked, I would have paid $50 more for a type of warranty I didn't want—and wouldn't use.

5. Is 24-hour burn-in standard? This, too, applies only to computers that are custom built. But if you're going this route, ask about the 24-hour burn-in (in which the computer is left running while a series of diagnostics checks components). One hint: If they tell you it can be ready 24 hours after you order it, they aren't doing a full burn-in.

By Roberta Furger

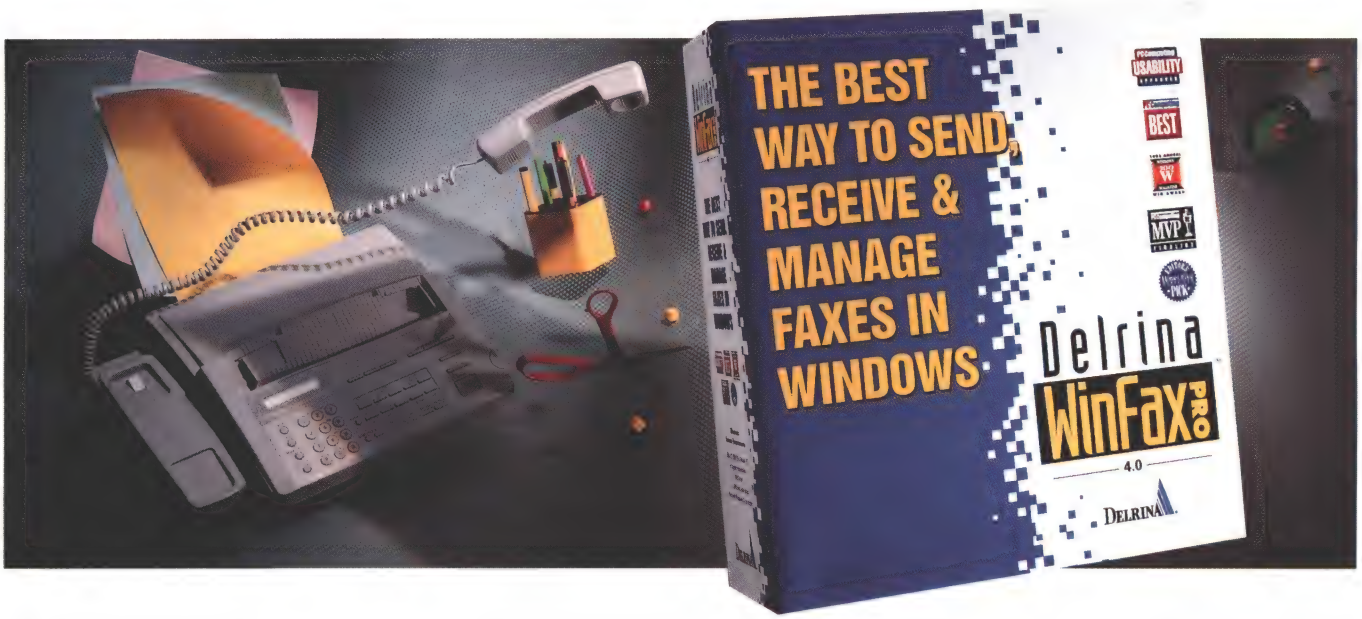
ROBERT HOLMGREN

KEEPING UP



Gateway 2000 PC owners take note: On-site service for Gateway computers will now be handled by Hewlett-Packard, which provides independent repair services throughout the United States and Puerto Rico. According to Gateway, its technicians will first attempt to resolve problems over the phone. If that's not possible, they'll ship replacement parts to the customer, who can either install the new part, or have an HP repair tech do it on site...Is the clock in your PC slowly losing time? You may want to check your system's CMOS battery. It powers a RAM chip, which in turn stores the system's time and configuration settings, even with the power off. According to a spokesperson for Rayovac, which is conducting a national campaign to alert PC users to the issue, PC batteries last about three years. As the battery begins to die, your computer's clock loses time. When the battery fails completely, your PC forgets its configuration when you turn it on—rendering it unusable.

Introducing Delrina WinFax PRO™ 4.0. You'll wonder how you ever faxed without it.



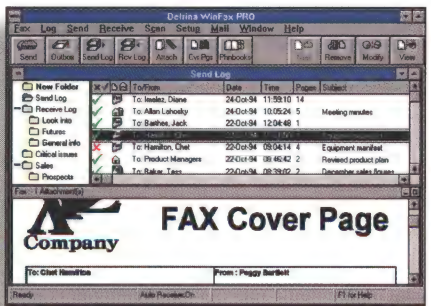
Meet the fastest, easiest, most convenient way ever to handle all your faxing – new Delrina WinFax PRO™ 4.0, the latest version of the best-selling fax software in the world. The only one that combines the advanced faxing features you need with astonishing new ease and usability.

"The best fax package there is."

That's what *PC/Computing* said about version 3.0. And now we've made it even better.

Starting with the revolutionary new streamlined interface that makes it simpler than ever to do anything you'd do with a fax machine, and a lot more. Like sending faxes directly from within any Windows application as easily as you'd print. Or organizing sent and received faxes in convenient folders. Or converting faxes into word processing documents with OCR.

There's added convenience with dozens of ready-to-use cover pages. Fax phonebooks that are drag-and-drop simple. And improved fax annotation tools that even let you add your signature.



Based on extensive usability testing, the new customizable interface includes folders for organizing sent and received faxes.

Don't try this with a fax machine.

Imagine faxing, not just an image of a document, but the actual file itself*, so it's ready to be used in an application. Imagine sending a single document that is automatically faxed to some people and e-mailed to others.

Now imagine you're on the road, and WinFax PRO automatically forwards faxes to you. Or lets you retrieve faxes sent to your regular fax number*. And there's more.

Get new Delrina WinFax PRO 4.0 today and put faxing where it really belongs – on your PC. Call now for information or to upgrade from WinFax PRO or WinFax LITE™. Or see your local dealer to upgrade immediately.

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*Requires Class 1 modem.

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It's QIC-80 and AccuTrak 250 compatible. And, it includes Conner's Backup Basics™ for DOS® and Windows,™ a simple two button software program. What's more, Conner backs up everything with a two-year warranty.

The Conner Tape•Stor 250 Parallel Port—for people who are going places. Call Conner at 1-800-230-5638 for more information or visit your nearest retailer. And leave your backup worries behind for good.

Tape•Stor 250 MB Parallel Port Tape Backup System

Feature	Conner Tape•Stor 250 MB Parallel Port	Colorado Memory Systems Trakker 250 MB
Carrying Case	FREE	$49.00
QIC & AccuTrak	Total Compatibility	No AccuTrak Compatibility
Warranty	2 years	1 year
MTBF	100,000 hours	40,000 hours
Power Requirements	Internal Power Supply	Wall Adapter Required

CONNER
The Storage Answer.

* For a limited time, every Tape•Stor 250 Parallel Port System shipped will include a free tape drive carrying case. **Now available at: Best-Buy, CompUSA, Computer City, Fry's Electronics and all authorized Conner retailers.** Conner Peripherals World Headquarters, 3081 Zanker Road, San Jose, CA 95134. Tel: 408.456.4500. © 1994 Conner Peripherals, Inc. All trademarks or registered trademarks are property of their respective owners.

Circle 59 on reader service card

6. Can I test the computer before taking it home? This only works if you're buying locally, but it's one of the best ways to identify problems before you accept delivery of your new computer. Once my PC was assembled and burned in, I stood by while the service technician faxed a document, logged on to a local bulletin board system, and played a CD ROM. Everything worked fine, and has continued to work since I got it home.

7. Can I quote you? Most stores and mail-order companies will quote you a price based on a specific brand or configuration. Get the quote in writing, and ask how long they'll honor the price. It'll save you a tremendous amount of time later, when you're comparing configuration and pricing schemes from different companies.

8. Who makes the insides? You may not care who manufactures each component, but asking the question serves several purposes: It clues you in to how knowledgeable the sales staff is, gives you valuable information (should you care to research suppliers), and lets salespeople know they can't put something over on you.

9. What else are you throwing in? Lots of software gets bundled with PCs these days. My new computer came with DOS, Windows, an electronic Rolodex, a handful of other utilities, and trial memberships to CompuServe and Prodigy. Don't be swayed by stuff you won't use, but *do* factor in the price of software you would buy anyway.

10. Who do I call if I need help? Get the number for the PC maker's technical support line and call it, preferably during the hours you would most likely use the service. Do the reps answer right away? If they put you on hold, do they give you the option of leaving a message and getting a return call? How quickly do they call back? Is the staff friendly? Helpful?

11. Which PC would you buy? In stores that sell different models from different companies, ask a salesperson which product he or she prefers. I did, and most of the time got very frank and honest answers.

12. When will it be ready? Get a firm date for delivery. You should be notified of any delays. If the delivery date comes and goes with no word from the store or the mail-order firm, call your salesperson. If you don't get a satisfactory explanation for the delay, cancel your order.

Shop Talk

The majority of letters *Consumer Watch* receives are about problems getting through to technical support departments. There are but a few companies that flawlessly handle the volume of technical support calls they receive, and every company handles the matter differently. Here is a sample from this month's mail. —*Ed.*

A Cardinal Offense

Our company recently purchased a Cardinal Digital Sound Pro 16 from Cardinal Technologies in Lancaster, Pennsylvania. We called Cardinal customer support twice to ask about the wave-table synthesis chip for the card. We left messages asking the staff to call us back, but they never did. Even so, we bought the chip because its features looked good.

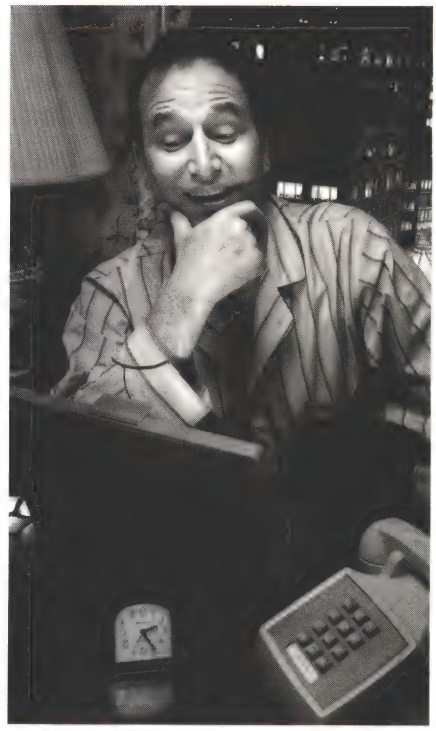
After installing the chip, we ran into problems. Some of the sound effects, such as speech, came out garbled, even though they sounded fine on a SoundBlaster card; there was no option for recording or playing sound at 48 kHz in DOS or Windows; and the system froze when we tried to access the sound setup in Windows.

We wrote to both Cardinal and Voyetra (the developer of the AudioStation software bundled with the Sound Pro 16). Within a few days, a Voyetra representative informed us that Cardinal may have sent us the wrong version of Voyetra's software and that we should get release 1.1 from Cardinal. Three weeks later, we received two disks from Cardinal with no explanation and no response to any of our questions. The disks turned out to be for AudioStation 1.09—not the 1.1 version we requested. The new software corrected only one of our problems.

Given the poor customer support we received, we have suspended any further purchases from Cardinal.

V. Ram, Bedford, Texas

Editor's note: We contacted a representative at Cardinal, who in turn called Ram and helped solve his problem. Cardinal also sent Ram the correct version of the Voyetra software. Ram assures us that everything is now working fine and his company is considering future purchases from Cardinal. Eric Dunn of Cardinal OEM support told us that Cardinal has installed a new phone system and hired additional personnel to



You can't sleep.
You can't call room service.
At least now you can get all your faxes.

Now you can get all your faxes whenever and wherever you travel. When someone wants to send you a fax, they simply send it to your Delrina Fax MailBox™ — using your own personal 800 fax number which we provide.

To instantly retrieve faxes with a PC or laptop simply use Delrina WinFax PRO™ 4.0 and a fax modem. Or just call your 800 number and enter your password to receive them via fax machine. If you have a pager, we'll notify you the instant you get a fax. Order today and we'll give you your first fifty faxed pages free.*

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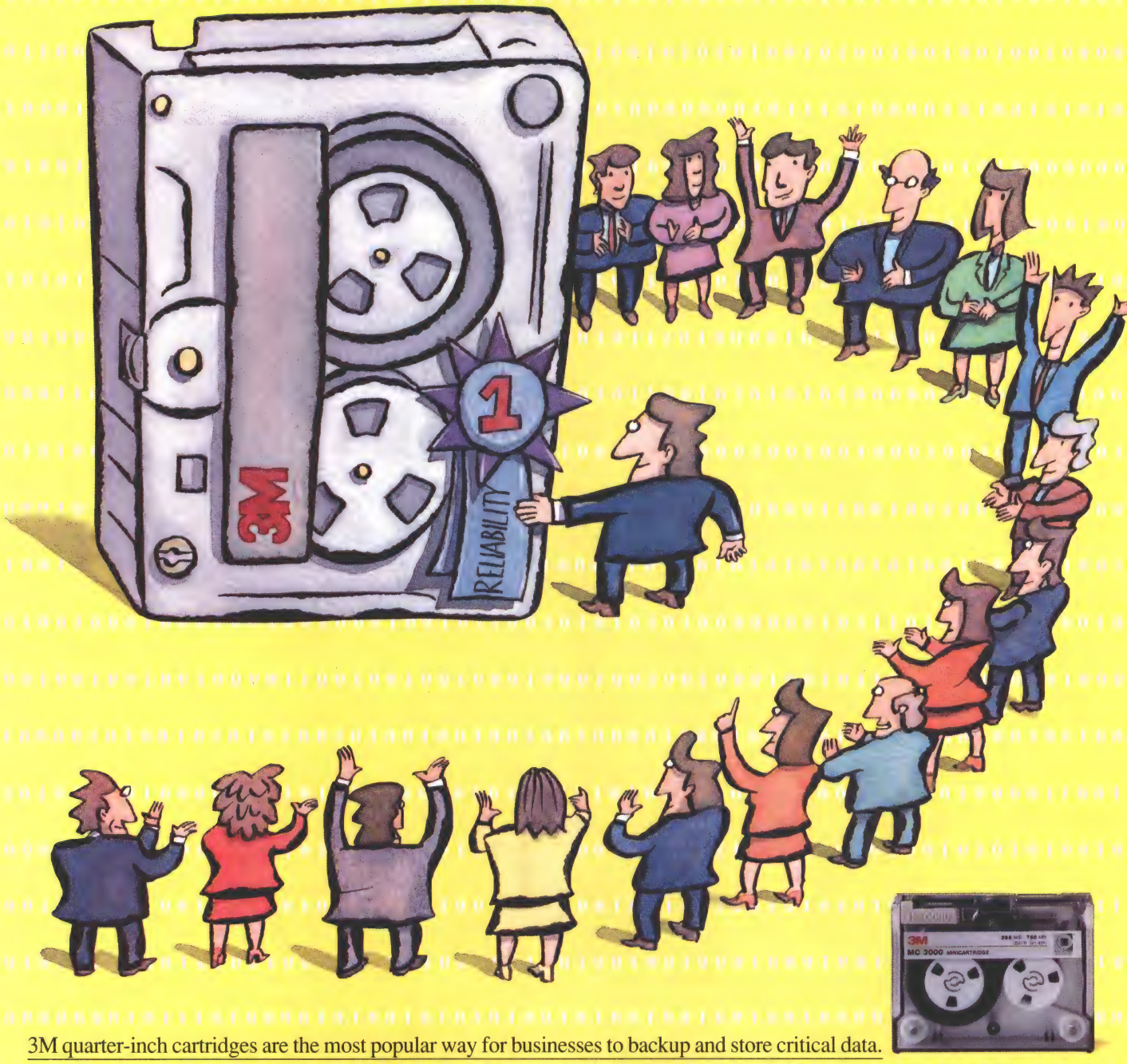
Rated number one in reliability by people who expect nothing less.



3M quarter-inch cartridges are the most popular way for businesses to backup and store critical data. Preferred seven to one over other brands–from 40 mb to over 5 gb, 3M brand quarter-inch cartridges are on the job day and night in over ten million drives. Durable, proven and rated #1 in reliability. That's why more businesses protect important information on 3M brand data storage products than any other brand in the world. For more information and your free "Data Security Handbook" call 1-800-888-1889, ext. 1102.

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3M *Reliability*

Circle 208 on reader service card

make it easier for customers to get through. When you call and lines are busy, they no longer take a message and promise to call you back. You enter a hold queue and they handle your call as soon as they get to it. Since the company installed the new phone system in December, Dunn says the customer service staff has kept hold times to less than 5 minutes.

Gateway Woes

The April letter about frustrations with Comtrade's lack of technical support ("Where's the Technical Support?") reminded me of the trouble I'm having with Gateway 2000. (Does 2000 stand for how many times you have to try before you get through to the company?) I faxed my complaint but have heard nothing in over three weeks. I suspect I'm not alone in this.

When I call Gateway, its phone system tries to put me on a queue, can't find a slot, and gives me a busy signal. I have no choice but to hang up and start over.

John Manning,
Huntington Beach, California

Editor's note: Manning is right: He's not alone. We have had a rush of calls and letters in the past few months from Gateway customers who can't get through to technical support. One reader sent a fax to Gateway technical support and got a fax in return from Gateway. It said Gateway is "currently experiencing delays in responding to faxes and letters." That's not uncommon in the world of technical support. But according to Gateway's fax, it would take 15 to 20 days to get a response. That's a hefty delay by any standard.

Gateway responds: According to Wendell Watson, Gateway's corporate communications manager, the company has recovered from the 15-day delay and now has the fax-response delay down to a maximum of 5 days—though it handles most faxes within one day. Gateway has also recently beefed up its online services for tech support. Try the BBS at 605/232-2224 or the driver-download BBS at 800/846-7562, if all you need is an updated driver. On CompuServe type **GO GATEWAY**.

Never Ever Connect

I have found the worst customer support lines on the planet, and they belong to a company that generally has a stellar reputation. The culprit is NEC, which I now know stands for Never Ever Connect.

Not only does NEC keep you on hold forever (two separate 30-minute stints in my case), the company leaves you in a black hole as far as knowing where you stand in the queue. All you get is a frequent, annoying message telling you what you already know—you haven't talked to a tech support person yet.

NEC sells a sophisticated and often ornery peripheral (my CD ROM drive) and is apparently so overwhelmed by befuddled users that it can't help them.

John Black, Germantown, Tennessee

Editor's note: According to Tom Jones of NEC's advanced media technical support department, "telephone hold times account for the largest number of complaints in the customer service industry today." And NEC is taking steps to correct the problem. According to Jones, NEC has a toll-free number, BBS, fax-back system, and fax-response service, and recently hired a consultant to evaluate the phone system so that the company can find ways to improve it.

Service Knowledge

We often hear only complaints about software companies, but I have nothing but kudos for Knowledge Adventure in La Crescenta, California. In January, I wrote to the company because its Space Adventure CD was running very slowly on my 486DX-50. I hadn't heard anything by February, so I sent the same letter again with a note at the bottom indicating there had been no reply to the first.

The same day Knowledge Adventure got my letter, a most gracious representative phoned me with apologies for not having

POWERTIP no.304

Keeping Help On Screen

Many Windows applications offer a command that forces a help window to stay on top so you can follow its instructions. A common command is Help • Help Index • Help • Always on Top. In Excel, though, the command is Help • Contents • Help • Always on Top.

Shane Devenshire
Walnut Creek, California

Until now, this is how many fax machines you'd need to send 24 faxes simultaneously. Today you don't need any.

New Delrina Fax Broadcast™ lets you use your Windows PC and a fax modem to send a fax simultaneously to a handful of people, or to hundreds (up to 10,000) with a single call. Simply compose your document, then use Delrina WinFax™ 4.0 to pick the recipients, and send it – we'll do the rest. Your faxes will be delivered instantly, or at a time you specify. Call us today to receive $50 of free faxing!*

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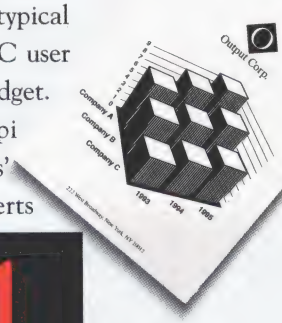
If you thought that outstanding clarity and detail were only possible with a premium-priced laser printer, take a close look at the new OL410e. Now you can produce the same superb output you see here for a lot less. The OL410e is an easy-to-use 600 dpi-class output printer with 4 pages-per-minute speed, at a price well below typical 600 dpi lasers. With the OL410e, any PC user can look *Fortune* 500® on a home office budget.

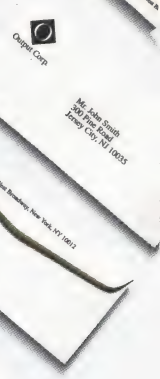
Okidata also offers standout 300 dpi resolution with *PC Magazine*'s Editors' Choice winning OL400e. The experts said, "...if you want laser quality, you won't find a better bargain." Both models support Okidata's tradition of reliability with an unsurpassed 5-year LED printhead warranty.

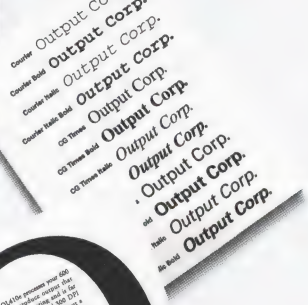
See Okidata 400e-Series print quality for yourself. Call 1-800-OKI-TEAM ext. 500 (U.S. or Canada) for your nearest dealer. You'll find values that make your output stand out.

YOUR BUSINESS HAS NEVER LOOKED BETTER.™

Stand Out







OL400e

OL410e

The New OKIDATA
a Division of Oki America, Inc.
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BUG WATCH

PC DOS 6.1

Recently IBM announced version 6.3 of PC DOS, but if you haven't upgraded to the new version yet, you can now download fixes for three separate bugs in PC DOS 6.1.

If you compress files on your hard disk using MS-DOS 6.0 or 6.2 and then upgrade to IBM's PC DOS 6.1, you could bump into a stubborn incompatibility between Microsoft's DoubleSpace and the SSTOR/DOS utility that IBM licensed from now-defunct AddStor. If the compressed volume file (CVF) is smaller than 16MB, SSTOR/DOS will generate a divide overflow error when it tries to mount the DoubleSpace compressed volume file as DOS loads. IBM has placed an updated version of the DOS system file IBMDOS.COM, which solves the problem, on CompuServe. The update also fixes a problem with the DIR command, which can report file names incorrectly when used with the original IBMDOS.COM. The update's on CompuServe (GO PCDOS) as IBMDOS.ZIP.

A glitch in the DoubleSpace driver (DBLSPACE.BIN) that ships with PC DOS 6.1 causes disk compression users to lose access to the CD ROM after exiting Windows. You can find an updated driver in the same CompuServe library (GO PCDOS). Look for DBLSPA.ZIP.

Finally, FoxPro 2.5, Clipper, and other applications that require expanded or extended memory may not work correctly with PC DOS 6.1. An updated version of the EMM386.EXE memory manager fixes the problem, and can be found on CompuServe as EMM386.ZIP.

Winfax Pro 4.0

No one reported bugs in Delrina's recently released fax software upgrade, but users do need to know how to get around two minor problems with the product.

Due to a lawsuit pending when the product was released (it has since been resolved), Delrina omitted remote fax retrieval and mailbox features that were in earlier packages of the product. If your copy included a notice apologizing for the omission, it lacks the features. The company has posted a patch, WFX401.EXE, on its own BBS and on CompuServe (GO DELRINA) that enables the features. Or call 800/967-3023 and ask to get the patch on disk. Both of these Winfax Pro 4.0 features require a Class 1 modem.

Some longtime Winfax Pro users may have discovered another glitch when installing the program. Earlier versions of Winfax Pro stored program files in the \WINDOWS directory by default; version 4.0 stores them in a directory called \WINFAX. If the previous version's program files are still located in the \WINDOWS directory, Winfax Pro 4.0 will generate an error when you launch it, and the program won't run. The solution is to change to the \WINDOWS directory and issue the command DEL WFX*.*. According to a Delrina spokesperson, the installation program included with newer copies of Winfax Pro 4.0 will detect older program files and prevent the conflict.

—Scott Spanbauer

Have you run into a software bug or hardware incompatibility? Call us at 415/978-3253 with the details. We'll investigate problems and report on those with the broadest interest.

Scott Spanbauer is a contributing editor for PC World.

answered the first letter, "which must have fallen through the cracks." Without hesitation he offered to send me a new CD, which works better on faster machines.

The day I received the new CD, someone from Knowledge Adventure called to make sure it arrived and to apologize for the delay. (It took about seven days from California to Maryland.) The new version runs without a flaw.

I would recommend Knowledge Adventure to any computer user who appreciates first-class customer support.

Pat Anthony, Glen Burnie, Maryland

Shop Talk is written and researched by PC World *assistant editor Christina Wood. Think you've gotten a raw deal—or a great one?* Consumer Watch *wants to hear the details. We'll investigate complaints and publish letters with the broadest interest. See page 12 for contact information.*

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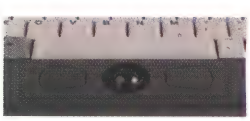

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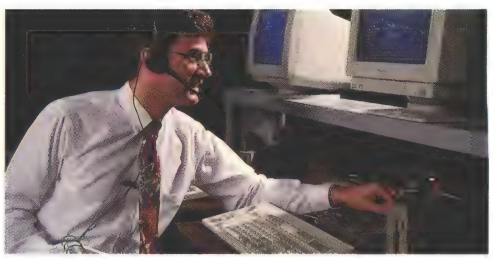

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Building Blocks and Mapping Markets at LEGO

When it comes to selling products and services, most people still rely on the traditional hunt-and-peck method: They hunt down names from business cards and source lists and peck them one by one into their office database. Then, with the help of a local street map and a thermos of coffee, they spend hours getting lost in traffic trying to locate a potential customer.

Sure, this method worked in the past, but it's no way to keep up with customers and prospects in the age of the information superhighway. This month Laura Post, a senior market planning analyst at the Enfield, Connecticut, office of LEGO Systems—the well-known manufacturer of those brightly colored building sets for kids—explains how she uses a mapping software package to keep track of markets, customers, and competitors for the Danish company. —*Ed.*

On the Sales Trail

As anyone who has ever worked in the retail business knows, manufacturers have one term for success: shelf space. The more successful a manufacturer is at getting stores to stock its products on their shelves, the better the company does as a whole.

My company sells its building toys in tens of thousands of retail chains and specialty stores throughout the United States. Our sales managers are responsible for overseeing the shelf space of hundreds of stores in a given region. To accomplish that, they hire merchandisers to visit stores and make sure our toys are selling well and to keep display shelves clean, well-stocked, and attractive. My job as a market planning analyst is to find out the who, what, when, where, and why of LEGO buyers. I then provide that information to our sales force so merchandisers can sell the toys more effectively.

But without the appropriate tools, simply finding out where a store is located—let alone where the biggest markets are—can be a tricky business. Prior to the mid-1980s, it was almost impossible for our salespeople to discover, say, the exact locations of individual retail outlets prior to visiting the store. If a salesperson was paying a visit to stores in St. Louis, he or she might compile a paper list of store addresses, then spend hours studying maps and driving around the city in an effort to locate each store. If she made a 10 a.m. appointment on the north side, say, and a noon appointment on the east side, she might find out the hard way—due to a road closure, noon-hour traffic, or sheer distance—that she couldn't make her second appointment.

Similarly, if a diligent market analyst wanted to envision where the biggest markets were, or see the location of key stores in a given territory, he might have to attach a map of the United States to a wall, then stick colored pins in the map to get an idea of sites. But given the inefficiency and time-consuming nature of such a task, most people didn't attempt it.

Finding a Place to Park

I first began my foray into the world of computer-based mapping in 1992, when I used Atlas GIS, a DOS-based package from Strategic Mapping of San Jose, California. I decided to take it out for a test drive to study the potential of targeting LEGO Systems' in-store marketing efforts in different parts of the country more effectively. I started with Chicago.

The mapping software, also called a geographic information system (GIS), combines geographic maps with database information to yield a visual representation of a database query, such as a map of sales in every county in a given region. To test the package, I entered important information for a key account's stores in Chicago (including store number identifier, street address, and ZIP code) into the product's database. The resulting map, showing exactly where all the stores were located, helped us test a new, more effective method of servicing that account in the Chicago market.

Laura Post is a senior market planning analyst for LEGO Systems.

With that test behind us and Atlas GIS installed on our network server, we began doing detailed market analysis using several add-on databases from Strategic Mapping. These enormous databases (now stored on three CD ROMs) contained not only geographic features, such as all the ZIP codes in the United States, but also detailed demographic information, such as population, income, and educational level.

For example, we used the software to find a site for a LEGO theme park in the United States. The goal was to find regions that had a concentration of families with children, a good income level, and few competing attractions. The result was a color-coded map that showed us areas with high and low pop-

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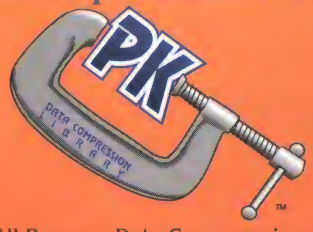

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ulation density and income levels. (We finally settled on Carlsbad, California, north of San Diego.)

Pay-Out Versus Payoff

There is a downside to all of this. First, at a base price of $1595 per workstation—not including the specialized databases—the GIS software is not cheap. Second, learning the software and harnessing its capabilities requires a time investment, even for people with database skills. And third, the process of entering all the criteria and then cross-referencing it on a map of, say, ZIP codes—there are 40,000 in the United States—can be labor intensive.

But these are fairly minor concerns, considering the almost incomparable advantage this knowledge gives us in our highly competitive market. We now have a database with maps showing the locations of key retailers. We use this resource to provide good service, while ensuring that our product section is well merchandised and maximized to sell. Using a map that shows all the key stores within a 25-mile radius of a market area, our sales reps can plan their weekly visits based on the location, rather than wasting time driving around. And using the regional information, we can show how LEGO sales are distributed throughout sales territories.

I'm also using the GIS software to evaluate the distribution of LEGO shipments. By combining shipment data with the mapping software, I can see that we might ship 10 percent of our product into the New York metropolitan region. By comparing actual sales with the size of the market, I can tell how well we're doing in a given area. And in the future, I may use the software to combine data from reply cards—such as the addresses of purchasers or the ages of users—to do advanced micromarketing analyses.

In fact, there is so much potential for integrating geographic information systems into our business operations, we haven't even begun to explore all the possibilities.

Edited by Bronwyn Fryer

Bronwyn Fryer is a contributing editor for PC World. *If you use PCs to manage people and other resources in a business environment, we want to hear from you. See page 12 for contact information.*

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Speaking of the PC industry, if you've been hangin' around the PC Saloon for long, you'll recognize that this Gateway ad is a sequel to one that ran way back in the summer of 1990. Taking our cue from Hollywood, we reckoned if "Saloon" was a good ad, we might as well do "Saloon 2 1/2." What was surprising about lookin' back was seeing how many things have stayed the same.

The players around the industry poker table have changed some, but the game hasn't. Gateway's strategy is to deal you a royal flush of value: high-performance, high-quality PCs at the very best prices with old-fashioned, good service. Same as always. And although Gateway has become a Fortune 500 firm, we still think like a small, maverick company from the South Dakota frontier.

Yesirree, when you have a hankerin' for a PC, just holler. We'll give you the best deal in all the land.

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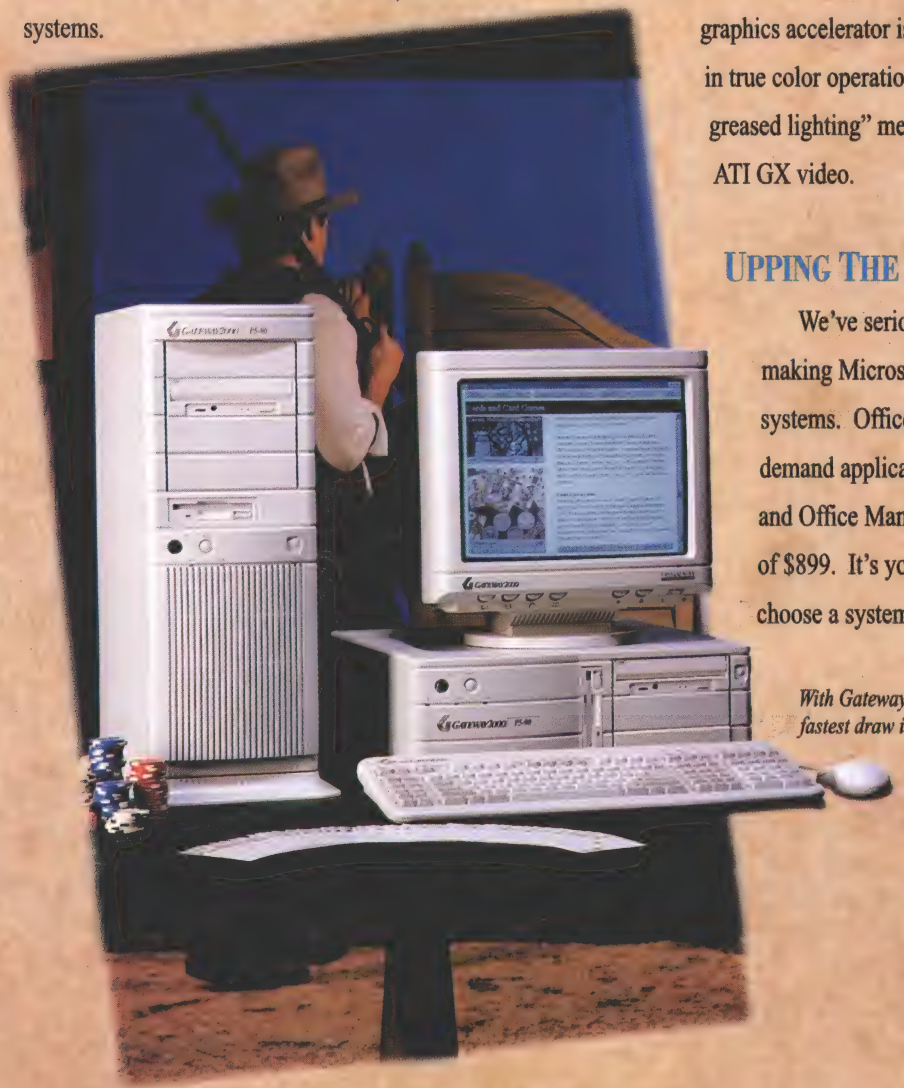

Gateway's ace of spades is the P5-90 tower model, which includes most everything a PC-poke dreams of, for $3,999. (In the 1990 "Saloon" ad, our most advanced system was a 25MHz 486 with 4MB RAM and a 150MB hard drive for $5,295!)

QUICK DRAW

New this month, the P5-90 tower has an ATI GX video card for a lightning-fast draw. The ATI GX video card uses the Mach 64 graphics accelerator — one of the first and fastest 64-bit accelerators on the market — and delivers over *100 million Winmarks* of video performance in Winbench 3.11 tests. This graphics accelerator is *twice as fast* as other 64-bit accelerators in true color operation. You'll understand what "faster than greased lighting" means when you try the P5-90 tower with ATI GX video.

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We've seriously upped the ante in the industry by making Microsoft Office Pro standard on many of our systems. Office Pro includes Microsoft's most in-demand applications: Word, Excel, PowerPoint, Access and Office Manager, all latest versions, with a retail value of $899. It's yours at no additional charge when you choose a system configuration with Office Pro standard.

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pentium PROCESSOR

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If you know when to hold 'em, you'll hang onto the ColorBook™ from Gateway 2000. It's a rare card in the portable game that gives you outstanding color and desktop performance at a monochrome portable price.

The ColorBook comes in four 486 models, including the latest 75MHz DX4. Three ColorBook models include a 10.3-inch dual-scan screen, which is the biggest color portable display on the market. You won't find a screen this big, this affordable, anywhere else.

Weighing less than 5.7 pounds, the ColorBook is one of the thinnest color portables around. The ColorBook comes with a powerful Intel SL Enhanced processor — 486SX, DX2 or DX4 — and gives you 256 brilliant colors in VGA mode. You'll also appreciate its built-in trackball, large hard drive, simultaneous video support, excellent battery life, two PCMCIA Type II slots (or one Type III), and suspend/resume feature.

GATEWAY2000 HANDBOOK 486

The wild card in our hand is the HandBook® 486. While people usually don't get hooked on computers, this little beauty is so compelling that use of it may be habit-forming. And now the HandBook comes with even more features standard. You get an external diskette drive, a PCMCIA fax/modem, two batteries and a dandy leather carrying case — all included. Once you get your hands on a HandBook, you never want to put it down!

The HandBook 486 is the lightest Intel-based 486 portable available today. It weighs less than three pounds and measures roughly 10 x 6 inches. The HandBook's power and portability make it the perfect traveling companion.

HandBook models include a 25MHz 486SX and a 40MHz DX2 based on Intel's SL Enhanced energy-efficient processors. The HandBook has a bright, backlit VGA screen and a comfortable, touch-type keyboard. You'll also like the HandBook's EZ Point™ integrated pointer, PCMCIA Type II slot, and long-lasting nickel metal hydride battery. You can "hot swap" with the HandBook, too — change batteries or peripherals while the PC is running without rebooting the system or losing any data.

Deal yourself a great hand with the HandBook 486 or the ColorBook from Gateway 2000.

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Will Multimedia Ever Get Down to Business?

If someone tries to sell you a multimedia system for the office, hold on to your money. Or at least pay for the equipment yourself, since it can hardly be justified for work. Sure, there are a few CD ROM titles that make sense for the office, but would you spend $600 on hardware just so you could use them?

I have accumulated every known multimedia gadget, and with the very occasional exception of a CD ROM program, none has ever helped me do any useful work. Not the video capture board, not the 3-D mouse, not the Official Garth Brooks–look-alike microphone and headset. I've stopped making excuses when people admire the speakers sitting next to my PC. Like most CD ROM owners, I use the drive more for playing music and games than for anything remotely business related.

Multimedia Trojan Horse

Corporate PC buyers, sensing this general truth, have been loath to buy multimedia PCs, fearing that entire companies would become addicted to 7th Guest or whatever game Egghead had on sale. Work as we know it would stop. The economy would be laid to ruin, all because stereo speakers and CD ROM drives appeared on business desktops.

Today's CD ROM business applications are typically reference disks of no particular interest to the mass business market but absolutely essential for the operation of some vertical market application. For users of such programs, a CD ROM drive makes a lot of sense. The one CD-based app I get value from—and it makes the purchase of the drive worthwhile—is AccuMail, a program that stores the entire national ZIP code directory on a disk and uses it to bar code my mailing labels. It also standardizes address formats, saving me money on every mailing. • *$1095 per year; $295 per quarter; Group 1 Software; 800/368-5806. Reader service no. 736*

The proliferation of suites presents the most convincing case for CD ROM drives on business desktops. The aggravation of installing suites from all these little black disks will have people buying CD ROM drives in self-defense. Purchasing a CD ROM drive for $100 or so is a great strategy, and maybe silver disks will replace the piles of black ones. But until desktop computers include a CD ROM changer, I'm not interested in online documentation, given how often I'd have to swap disks.

As for the rest of multimedia—sound and motion video—the definitive app will tightly integrate telephone, voice mail, E-mail, and computer. As E-mail popularizes local area networks, improved connectivity should help sell multimedia machines. Businesses need better communications, and if multimedia can improve productivity, companies will invest in it. Down the road, we'll even buy desktop conferencing along with networked video services.

But the change will take years, given the longevity of phone systems, the lack of standards for connecting phones and computers, and the limited bandwidth of local area networks. And of course, there's the challenge of getting multimedia and a network to run on one PC at the same time while still leaving enough memory for Windows plus an application or two.

Business Applications

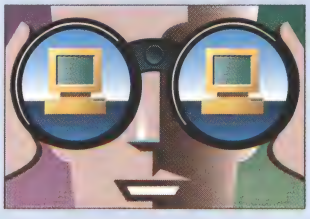
If you can surmount this hurdle, take note: WordPerfect has demonstrated a link between its E-mail package (inexplicably still called Office as I write this) and a telephone access server. Users can send voice messages and have their E-mail read back to them by using touch-tone telephone commands. You don't need your computer to get your E-mail.

For now, most businesses should save their money until the technology offers more tangible paybacks.

Contributing Editor David Coursey edits P.C. Letter. *He can be reached on PC World Online (see page 12 for contact information).*

By David Coursey

LOOKING AHEAD



The "in" screen saver this summer will be Gary Larson's The Far Side, published by Delrina...If you happen to be a fan of that mediocre talent who used to call himself Prince, check out a new CD ROM from the Graphix Zone. The product is called ☥ Interactive (☥ is the unpronounceable symbol the former Prince has chosen to represent himself). Sure, this music video–based adventure is bizarre, but the production is super. I haven't seen a final copy, so I can't say how easily it installs. Graphix Zone next takes on Bob Dylan, who is probably more my speed...If the diminutive keys on the Hewlett-Packard HP-100LX palmtop don't do it for you, you might want to consider a Psion Series 3a. The Psion costs less, it has a graphical user interface, you can link it up to a PC, and you'll find that it's considerably easier to use. However, the Psion currently lacks connections to the cool radio modems and pagers that the Hewlett-Packard supports...Please save me from *E-Mail Addresses of the Rich and Famous*, a new book by Seth Godin, who can't promise that you'll get any answers.

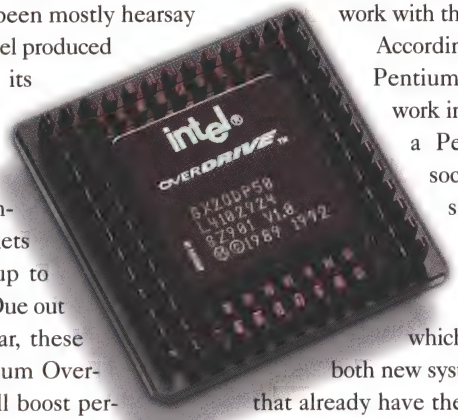
PROCESSOR UPGRADES REV 486 AND PENTIUM

The long-awaited Pentium upgrade chip should be here by year-end. Meanwhile, SX2 OverDrives are available, and DX4 upgrades reportedly are on the launchpad.

Edited by Russell Glitman

Owners of 486 systems with "Pentium upgrade" sockets must feel a little like cult members scanning the sky for an alien visitation. They know that *something* is going to land—but what, exactly, and when?

The sightings have been mostly hearsay until recently, when Intel produced a clearer snapshot of its much-anticipated Pentium OverDrive, a chip designed to let users of PCs with Pentium OverDrive sockets plug in and throttle up to Pentium-like speeds. Due out by the end of this year, these user-upgradable Pentium OverDrives supposedly will boost performance by 40 to 70 percent, depending on the application and the system's original CPU. Drop one into a 66-MHz DX2, and our best guess is that you will have the processing power of a 60-MHz Pentium.



Meanwhile, an advance party of new 486-class OverDrives is available. Shipping now is Intel's SX2 OverDrive, a clock-doubling chip for 25-MHz 486SXs that takes upgrade chip pricing to new lows: $249 list, and substantially less in stores. Sources close to Intel say that in late September you'll be able to buy DX4 OverDrives that run at triple the internal processing speed of either 486SX or 486DX systems operating at 25 or 33 MHz. Any of the SX2 or DX4 OverDrives will plug into a standard DX or DX2 socket or an SX OverDrive socket.

Hurry Up and Wait

When the Pentium OverDrive finally arrives in the fourth quarter, two years will have passed since the first DX2 system with a Pentium OverDrive socket hit the market. Much of the wait, according to Intel product marketing manager Bob Bennet, will derive from efforts to get the Pentium OverDrive to work in a broad range of systems containing the special socket. Overheating was the main problem, and Intel finally conquered it by adding a small cooling fan to the chip. Contributing to the delay were Intel's desire to incorporate some of the latest technology from its new 90-MHz and 100-MHz Pentiums into the chip, along with the logistical problem of getting the 64-bit Pentium bus interface to work with the 32-bit 486 bus.

According to Bennet, "The Pentium OverDrive will work in every system with a Pentium OverDrive socket that was designed to our original specification." But Intel's verification program, in which the company tests both new systems and older PCs that already have the sockets, indicates that a significant number of systems will not make the grade. How many? In early May, Bennet would say only that the chip will work in "the majority" of existing PCs with Pentium OverDrive sockets.

That's a very different situation from the original OverDrive scheme for 486SX machines, in which an OverDrive socket virtually guaranteed that an OverDrive chip would work. (At press time, Intel had a list of over 450 systems, from more than 40 vendors, verified as compatible with the Pentium OverDrive; to see if your system is on the list, call Intel's fax-back service at 800/525-3019.)

Although many buyers have "upgradable processor" on their shopper's checklist, the vast majority of business users pass along old machines and buy new ones rather than specifically upgrading CPUs—and Intel wins either way. According to Mark Davis, a consultant for Martin Marietta in Knoxville, Tennessee, most of the users he's talked to "haven't thought much about processor upgrades" and probably don't know whether or not they have a Pentium OverDrive socket. "If you don't want a new system, the best upgrade is a new motherboard," says Davis; you get more performance improvement, and the cost isn't much higher than that of an upgrade chip alone.

News Monitor

EYE ON CHICAGO: The next version of Windows, a.k.a. Chicago, made its first on-the-record appearance before computer press and analysts in mid-May as Microsoft prepared to roll out a few thousand copies of the beta. Officials said Chicago was 95 percent code complete and on target for delivery by year-end. Designed to be easier to use than Windows 3.11 and less prone to crash, the new version incorporates sweeping changes. A few of the new features: A Start button on an expandable floating Task Bar provides quick access to programs. File Manager is replaced by the Explorer, which provides a more versatile way to view and organize information. A Shortcut feature creates a pointer to a file, a program, or any object on your desktop, which you can activate simply by clicking on that object. Send the Shortcut as an icon to other users on a network, and they can access the identified object just by clicking on the icon. A Quick Viewer feature allows you to preview at least 40 file types. More to come about Chicago next month

PAIN IN THE WRIST: Trials under way in Rhode Island and California are considering more than 2000 lawsuits that claim computer keyboards caused painful and even crippling hand and wrist injuries, according to the *Wall Street Journal*. Defendants include Eastman Kodak, IBM, and AT&T. Documents presented by the prosecution indicate the firms may have known for

(continued on page 59)

PHOTO ILLUSTRATION: JEFF BERLIN; PHOTOS: JOHN GREENLEIGH; ILLUSTRATION: JOHN MATTOS

Shifting Into...Which OverDrive?

Davis's calculation may hold true for the Pentium OverDrive, which will probably cost a bundle, but the low end of Intel's line is another story. Designed to double the internal processing speed of 25-MHz 486SX systems, the SX2 OverDrive is the first Intel upgrade chip that lacks a math coprocessor, and it's priced accordingly. According to *PC World* benchmarks, you can expect a performance improvement of more than 30 percent from a chip that sells for well under $200 on the street. As long as you don't do CAD or financial and statistical spreadsheet calculations, this is one hot upgrade.

Intel has also slashed DX2 OverDrive prices and is offering dealers new incentives for discounting. The retail price for the 25-to-50-MHz DX2 OverDrive is $369, but the selling price should be closer to $200; discounts on the 33-to-66-MHz DX2 OverDrive, which retails for $399, should be similarly deep. And although sources close to Intel expect retail prices between $500 and $800 for its DX4 OverDrives, you can be sure prices will drop when the Pentium OverDrive finally pops out of the oven.

Pentium Power and Beyond

Intel's most interesting revelations about future upgrades come not from what the company says but from what it does. Believe it or not, Intel has released specifications for no fewer than five different types of Pentium OverDrive sockets. All but one of these—the original 5-volt, 238-pin OverDrive processor socket—will hold one of several *next-generation* Pentium OverDrives that Intel refuses to discuss, except to say that they will be more powerful than the Pentium OverDrive that's to be released this year.

The hot socket to look for in most new 486-class systems is a 237-pin wonder that can hold any OverDrive processor, including this year's Pentium OverDrive and the next-generation Pentium OverDrive chip that nobody's talking about. Unfortunately, it's not that easy to tell which socket your system has. The best way to find out is to check with your vendor or to get in touch with Intel's fax-back service.

PROCESSOR UPGRADES ARE OKAY, says Mark Davis, a Martin Marietta consultant, but the best upgrade is a new motherboard.

The socket for the future Pentium upgrade can also be found in DX4 systems in a 235-pin configuration. Virtually all new Pentium systems can also accommodate this future Pentium OverDrive chip. Two sockets are designed to receive the chip: one with 273 pins for 60-MHz and 66-MHz Pentium systems, and one with 320 pins for 90-MHz and 100-MHz Pentium systems.

To further complicate matters, many 90-MHz and 100-MHz Pentium systems will come with 320-pin sockets that can hold either the next-generation Pentium OverDrive or a second Pentium CPU for multiprocessing.

If you buy a Pentium system with an OverDrive socket, one thing that you probably will *not* have to worry about is whether a future Pentium OverDrive will work in your machine—adding a faster Pentium to an existing Pentium system should be a smooth upgrade.

How could things get any more complicated? Well, wait until IBM gets into the act. The company's agreement with Cyrix gives IBM the right to sell under the IBM name any chip IBM manufactures for Cyrix. So far, Cyrix's upgrade chips have all been 386-to-486 offerings (or wimpier), but no one expects this state of affairs to last, and IBM has made noises recently about the "viability" of the CPU upgrade market. A little competition will do Intel some good—and you, too—by forcing CPU upgrade prices down. We'll keep you posted.

—Eric Knorr

Intel Moves Into OverDrive

	50-MHz SX2 OverDrive	50-MHz DX2 OverDrive	66-MHz DX2 OverDrive	DX4 OverDrive[1]	Pentium OverDrive	Future Pentium OverDrive
Availability	immediate	mid-92	mid-92	third quarter	fourth quarter	unannounced
List price	$249	$369	$399	$500 to $800	unannounced	unannounced
Target systems	486SX	486DX, 486SX	486DX, 486SX	DX2, 486DX, 486SX	DX2	Pentium, late-model 486s
Compatible socket types (number of pins)	168[2], 169[3], 237, 238[4]	168[2], 169[3], 237, 238[4]	168[2], 169[3], 237, 238[4]	168[2], 169[3], 237, 238[4]	235, 237, 238[4]	235, 237, 273[5], 320[5]

[1] Unannounced information. Likely clock speeds will be 25/75 and 33/100.
[2] 486DX or 486SX socket.
[3] Original OverDrive socket featured in 486SX systems.
[4] In most DX2 systems to date.
[5] In Pentium systems only.

The Thinking Person's Notebook

TEST DRIVE More power, larger hard drives, and new options set the latest generation of IBM's ThinkPad family apart from the competition. The enhancements are well thought out, but IBM's thinking remains muddy when it comes to marketing the ThinkPad 360 and 755C. Try to get an active-matrix model, and you'll likely encounter lengthy delays due to continued shortages.

Road Scholar

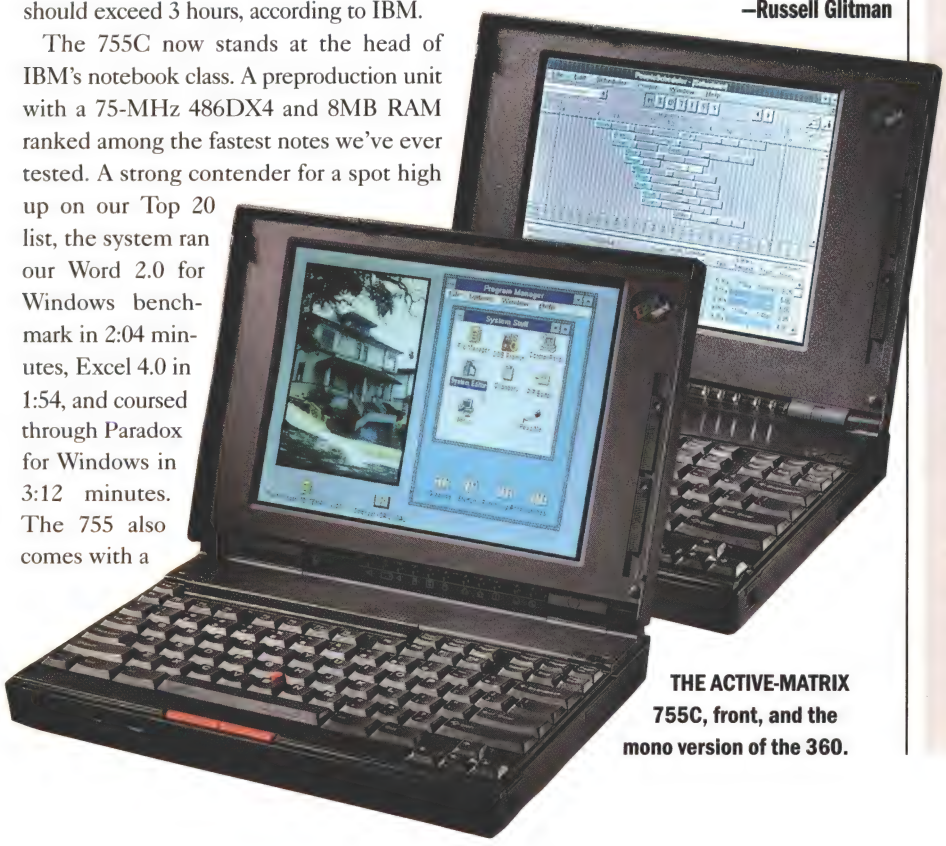
With the ThinkPad 360, IBM offers an entry-level notebook for the budget-minded buyer: Prices start at $1999. Using the same design as the ThinkPad 750, the 360 offers a range of screen options from a 9.5-inch monochrome to 8.4-inch active-matrix color. Powered by a 33-MHz 486SL enhanced, the 360 comes with 4MB RAM—expandable to 20MB—and a 170MB hard drive, with options up to 540MB. Traveling weight for the 360 ranges from 5.3 pounds for the monochrome unit to 6 pounds for the dual-scan color model. Battery life should exceed 3 hours, according to IBM.

The 755C now stands at the head of IBM's notebook class. A preproduction unit with a 75-MHz 486DX4 and 8MB RAM ranked among the fastest notes we've ever tested. A strong contender for a spot high up on our Top 20 list, the system ran our Word 2.0 for Windows benchmark in 2:04 minutes, Excel 4.0 in 1:54, and coursed through Paradox for Windows in 3:12 minutes. The 755 also comes with a 50-MHz 486DX2 processor, upgradable to 75 MHz. (The 75-MHz 486DX4 will be upgradable to the 100-MHz version of the chip, IBM claims.)

You get the largest screen on the market—10.4 inches—with the 755C's active-matrix display. The unit's dual-scan passive screen provides top-quality color and a 9.5-inch diagonal size, although the viewing angle is limited. Memory starts at 4MB and expands to 36MB. The active-matrix unit weighs 6.4 pounds; the dual-scan color is 6.1 pounds. Battery life should be just over 3 hours, IBM claims. Prices start at $3599 for the dual-scan 50-MHz ThinkPad 755CS; you'll spend about $5599 for the active-matrix version of the 75-MHz model.

Both the 360 and 755C have local bus video and include a PCMCIA Type III slot that accommodates two Type II or Type I cards. Any of these ThinkPads is a smart choice. With the 360 and 755, IBM replaces the 750 but offers buyers an affordable entry to computing and a high-end performer.
•*IBM; 800/772-2227*

—Russell Glitman



THE ACTIVE-MATRIX 755C, front, and the mono version of the 360.

News Monitor

(continued from page 57)

years about injury complaints tied to keyboards and that they established training programs for their own employees to prevent such injuries.

LOW-END LASER ALTERNATIVES: Before you buy a 4-ppm, 300-dpi laser printer for your small or home office, check out the new crop of 300-dpi color ink jet printers. These ink jets offer laserlike speed plus color printing at sublaser prices. And the ink jet's comparative price advantage is expected to increase. The 4-ppm lasers, with street prices of $499 to $630 at press time, can't get much cheaper, says International Data Corporation senior analyst Marco Boer. But color ink jet prices will decline during the year as vendors introduce printers to compete with Hewlett-Packard's DeskJet 560C, which has an average street price of $573. In May, Texas Instruments will ship its first color ink jet, the microMarc Color, at an estimated $399 street price. Digital expects to ship the DECcolorwriter 520ic in June at a street price of $399. In July, Epson will ship its first color ink jet, the Stylus Color, which the vendor expects will sell on the street for $500 to $600. In September, Lexmark plans to ship a color ink jet, the ExecJet IIC, at a street price under $400.

VIRTUAL FAX MAILBOXES: Receiving faxes on the road just got easier. Delrina has introduced Delrina Fax MailBox, a service that gives subscribers

(continued on page 61)

DOS-of-the-Month Club: IBM PC DOS 6.3

TEST DRIVE ▶ Another month, another DOS upgrade. As Microsoft, IBM, and Novell—the software industry's triumvirate of DOS providers—continue their game of DOS one-upmanship, PC users are left pondering the eternal question: Whose DOS does what?

The latest entrant is IBM's PC DOS 6.3, an upgrade from 6.1. New with this version are integrated file compression and a collection of incremental improvements. While PC DOS 6.3 lacks the knockout punch that captures headlines, you can't argue with its price: It's free to PC DOS 6.1 users ($24.95 with the manual), and $77 to users of other versions of PC DOS as well as competitive brands from Microsoft and Novell.

This Month's DOSes—How Do They Compare?

	IBM PC DOS 6.3	Microsoft MS-DOS 6.21	Novell DOS 7
File compression	SuperStor	no[1]	Stacker 3.1
Backup	includes tape drive support	no tape drive support	no tape drive support
Networking	no	no	integrated peer-to-peer networking
Memory management	yes	yes	yes
Virus protection	detects 2000 viruses	detects 800 viruses	detects 1500 to 1700 viruses
List price	free to PC DOS 6.1 users (with manual $24.95), to other DOS users $77	$77.95, to MS-DOS 6.0 users $9.95	$99, competitive upgrade $69.95

[1] According to Microsoft, the next release of MS-DOS, scheduled to ship by the end of June 1994, will feature file compression.

No More Coupon

While data compression is one of version 6.3's key features, it's not new to PC DOS. Copies of 6.1 came with a coupon for a free copy of SuperStor, a data compression package from the now-defunct AddStor. In PC DOS 6.3, SuperStor data compression is integrated and converts MS-DOS DoubleSpace compressed files to SuperStor format. According to IBM, future versions of PC DOS and OS/2 will feature Stac Electronics' Stacker compression software.

Other PC DOS 6.3 improvements are targeted specifically at users of MS-DOS version 6.*x* and PC DOS 6.1. The new Smart Upgrade installation feature automatically retains all start-up configurations and their menus from earlier versions of DOS 6.0. Similarly, PC DOS's RAMBoost memory manager can now optimize and monitor each configuration setup. PC DOS's antivirus software can now detect more than 2000 viruses (up from 1500), and its SmartDrive utility now caches CD ROM drives.

At press time PC DOS 6.3 had a competitive edge over MS-DOS 6.21, which lacks data compression; Microsoft was forced to pull its DoubleSpace compression software from MS-DOS after losing a patent-infringement suit brought by Stac. This summer Microsoft plans to introduce a new version of DOS with a homegrown compression scheme. According to MS-DOS product manager Russ Stockdale, the new compression software will convert DoubleSpace files to its new format. (Both Stacker

NexGen Nx586 to Take On Pentium:

Another Intel challenger is stirring the PC microprocessor mix. NexGen MicroProducts of Milpitas, California, has shipped its Nx586 microprocessor and claims that the new chip matches Intel's Pentium in compatibility and performance, beats Pentium on price, and will be in desktop systems by the time you read this.

NexGen's Nx586 is a RISC chip designed to support x86 program instructions directly; other RISC chips rely on software emulation of an x86 CPU to support x86 programs.

Like the Pentium, the Nx586 includes a pair of execution units that can process two instructions at the same time, a primary cache controller, and a branch prediction unit that anticipates which instructions the execution units are likely to need. However, the Nx586 has twice the onboard cache of the Pentium—16K of instruction cache and 16K of data cache—and it integrates a secondary cache controller capable of supporting 256K or 1MB of secondary cache. The chip doesn't have an onboard math coprocessor, although NexGen will provide an onboard math coprocessor, the Nx587, as an option.

NexGen offers the Nx586 in 60-MHz and 66-MHz clock speeds to vendors at prices it claims are as much as 32 percent lower than Intel's Pentium prices. The company has signed up six motherboard manufacturers and four system vendors, including Tangent Computer and Compu-Tek. Tangent says that it will offer a system incorporating an Nx586, 8MB of RAM, a 340MB hard drive, and a 14-inch display for $1995.

NexGen also reports that it is developing an Nx686 microprocessor that should have two to four times the performance of the Nx586.

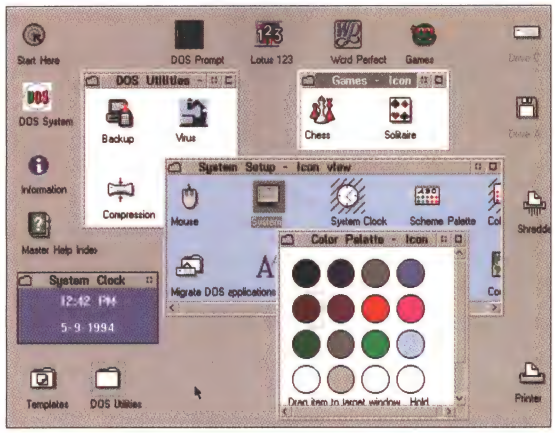
and PC DOS's compression software also convert DoubleSpace drives.) There is also a third choice that's particularly attractive to users considering peer-to-peer LANS: Novell DOS 7, which already features Stacker and began shipping earlier this year, is bundled with Novell's Personal NetWare. Novell's merger with WordPerfect may also create additional bundling arrangements. IBM, meanwhile, remains the undisputed bargain of the trio of DOSes—Microsoft charges $77.95, and you must own a prior version to buy it, although an upgrade from DOS 6.0 is just $9.95; Novell will want $99, while a competitive upgrade is $69.95.

Life After Chicago?

The next version of PC DOS, scheduled for release early in 1995, will include IBM's WorkPlace Shell, an OS/2-like graphical user interface that runs on PCs with as little as 640K RAM. Featuring an integrated file manager, screen saver, and icon editor, the WorkPlace Shell launches both DOS and Windows programs.

But considering the overwhelming market acceptance of Windows, one must wonder if the WorkPlace Shell is too little, too late. While it may appeal to the dwindling pool of DOS stalwarts, the Shell offers no advantages to Windows users. "The folks running state-of-the-art business applications have moved almost exclusively to Windows," says Dataquest principal analyst Rikki Kirzner in San Jose, California.

Furthermore, the next release of Windows (known as the Chicago Project within Microsoft and scheduled for release by the end of this year) casts a dark cloud over the future of DOS. According to Microsoft, Chicago is a 32-bit operating system that doesn't require DOS but will run DOS applications. If Chicago lives up to its hype, the market for DOS upgrades could fall precipitously. "We see DOS shipments beginning to decline in relation to Windows—I expect that trend to accelerate in the next five years," Kirzner says.



FUTURE DOS: IBM is developing a graphical interface, the Workplace Shell, to simplify using the next version of DOS.

However, IBM officials suspect that corporate users won't flock to Chicago as quickly as Microsoft believes. The reason: Businesses don't want to be guinea pigs for an untested operating system that's bound to have at least a few bugs. "Come January 1, DOS shipments won't fall off the charts," says PC DOS brand manager Karl LaWall. In fact, IBM has stepped up efforts to sell PC DOS to system manufacturers, who typically preinstall MS-DOS on their PCs. According to IBM, more than 40 system vendors now bundle PC DOS, including Dell Computer, which offers it as an option

Surprisingly, not all of IBM's PCs ship with PC DOS. Big Blue recently announced that its bargain ValuePoint PCs will finally include IBM's own DOS, but at press time the company's Ambra subsidiary was still using MS-DOS. While it's too early to proclaim DOS's death, the next version of Windows, which incorporates DOS, leaves some doubt as to how popular DOS will be with OEMs in the years ahead.

—Jeff Bertolucci

PC DOS 6.3

The latest iteration of DOS from IBM.
Key Features: Integrated compression
• Detection of 2000 viruses
Pricing: Free to PC DOS 6.1 users, $77 to all other DOS users
Availability: Immediate
IBM, 800/342-6672

News Monitor

(continued from page 59)

individual toll-free numbers for receipt of faxes. Faxes sent to this "virtual mailbox" are held until retrieved. As with some existing services, you can forward the fax to a destination fax machine—but you can also retrieve the fax directly from your notebook or desktop PC, using WinFax Pro. The service costs $9.95 per month, plus fax retrieval charges (50 cents per page for the first 10 pages, 45 cents a page for pages 11 through 49, 35 cents for each page beyond that). Delrina Fax MailBox also holds voice messages as an option for $9.95 a month.

MEDIA VISION'S WOES: Once the darling of Wall Street, Media Vision is now under federal investigation for possible securities violations. The Fremont, California, manufacturer of multimedia upgrade kits, graphics boards, and CD ROM titles is the target of an FBI and Securities and Exchange Commission probe. Media Vision laid off 50 employees—14 percent of its work force—and has suffered heavy financial losses in recent months. The company's management team resigned in May. Despite these troubles, Media Vision will continue to ship multimedia products, claims company spokesperson Elizabeth Fairchild. However, the company is abandoning other product categories, including development efforts in the cable TV set-top business, she says.

Edited by Randy Ross
Contributors: Joe Abernathy, Jeff Bertolucci, Russell Glitman, and Laurianne McLaughlin

Corel Adopts the Suite Approach

TEST DRIVE

Contrary to the popular opinion, CorelDraw is *not* a drawing program. This may seem a radical claim, but Corel is essentially a single-page publishing tool.

Sure, CorelDraw lets you whip up images from scratch, but its forte is letting you plop objects—fonts and clip art, for instance—onto a page where you can manipulate them. Corel comes with hundreds of TrueType and PostScript fonts and thousands of classy clip-art images you can skew, stretch, flip, and otherwise contort.

You also get a satchel of utilities ranging from presentation graphics to bit-map tracing. A decent file converter imports and exports more than 40 bit-map and vector formats, although it can't beat dedicated utilities such as HiJaak.

PHOTOREALISTIC EFFECTS ARE EASY with Corel's new Lens feature, which lets you magnify, invert, and overlay images.

All in the Family

Not surprisingly, a quick spin with a prerelease copy of CorelDraw 5 shows that this kitchen sink approach to graphic arts still dominates the product. For starters, $895 ($695 on CD ROM), also gets you a coupon for a free copy of Ventura Publisher 5, which should be ready to ship with Corel by late summer. Ventura finally has a Windows interface plus 825 TrueType and PostScript fonts and 22,000 clip art images. The company will also sell Ventura separately for $500 to $600.

In the interface category, CorelDraw, Ventura Publisher, and their posse of modules finally look like members of the same family. The programs sport similar tool bars and offer floating toolboxes and menus you can place anywhere on screen. They also share components such as import and export filters, fills and texture menus, and dialog boxes for calibrating screen colors between color printers, monitors, and scanners. Integration between modules is enhanced with limited OLE 2.0 support; you can now drag objects from one Corel application and drop them in another. For example, you could drag a pie chart created in CorelChart and drop it in CorelDraw. But only Ventura supports in-place editing—an OLE feature that lets you edit an embedded object on the spot without loading the application that created it.

Naturally, Corel has some new graphics goodies: A Lens feature lets you magnify, invert, and overlay images to create photorealistic transparencies; you can join different paths and seamlessly meld two objects drawn separately (such as a vase and a handle); and you'll find some new 3-D extrusion effects. There's one extra that everyone will appreciate: A pared-down version of Ares Font Minder enables you to create custom font groups.

Bug Corral?

But while all of these changes are welcome, some important questions remain unanswered. When Corel 5 ships, will it be relatively bug free, or will users suffer through repeated revisions to fix bugs, as in the past? "Users will *absolutely* see fewer bugs in 5," pledges Bill Cullen, a Corel quality assurance team

Little Big Drive:

Portable storage capacity reached a new high this spring with the release of a 260MB PCMCIA hard disk drive from MiniStor Peripherals of San Jose, California.

The 1.8-inch PCMCIA Type III drive uses Stac Electronics' Stacker Anywhere data compression utility to achieve this unprecedented capacity, but even without compression, you get 130MB of storage in a drive that fits in the palm of your hand. With a list price of $499, the exotically named MP260P3 drive stores data for $1.91 per megabyte. Although that's about twice the cost per megabyte of standard hard drives, it's one of the lowest per-megabyte costs that we've seen for this portable media.

MiniStor claims the rotating-media drive's unique production process ensures longer life and reliability. The drive is filled with nitrogen, then sealed to prevent problems caused by pollutants and humidity. According to the company, the drive can withstand shocks up to 200 g's while operating, 900 g's when not in use.

MiniStor says the drive is compatible with products from more than 20 notebook vendors and that users can easily disable the compression option. The MP260P3's storage record may not last long, however. Analysts expect to see 1.8-inch 240MB *uncompressed* PCMCIA drives by this time next year. MiniStor, 800/943-0165. Reader service no. 745

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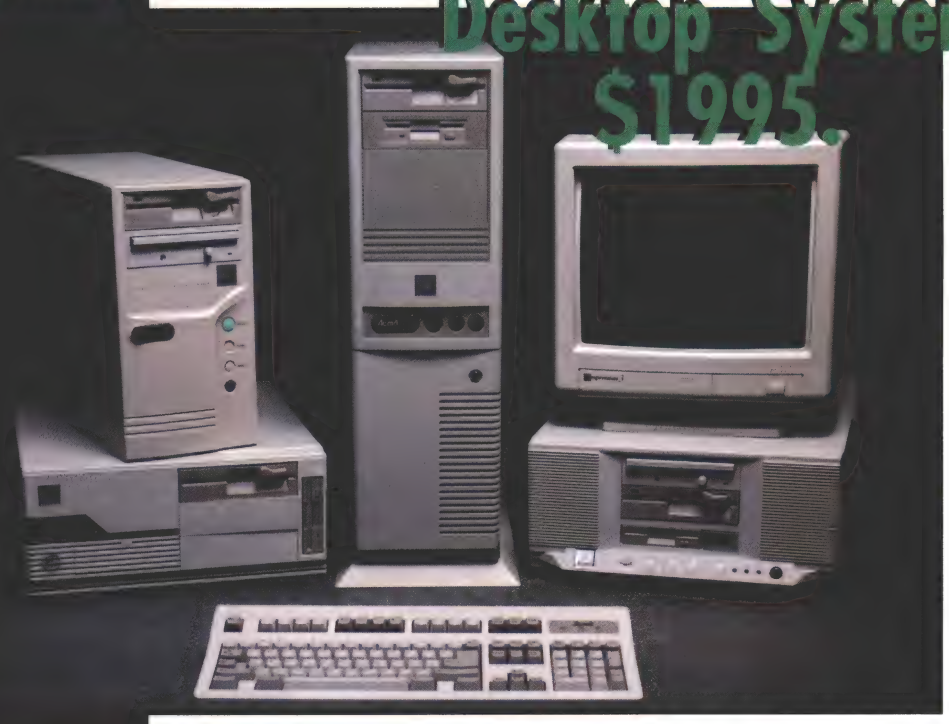

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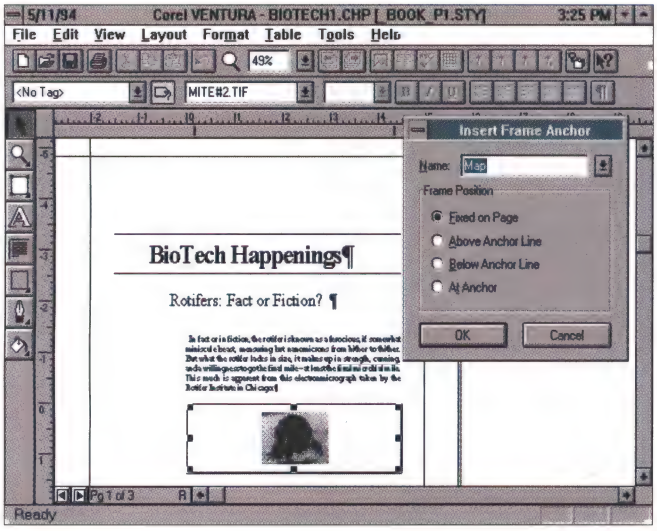


THE WINDOWS LOOK FOR VENTURA. And Ventura matches the Corel interface from toolbox to tool bar to roll-up and portable menus.

Continued from page 62

leader. *PC World* will test a shipping version later to see if Corel lives up to its promise.

To ensure a smooth upgrade, Corel has doubled the number of beta testers for this version and set up an automated testing lab that runs the program through thousands of operations. According to Chris Dickman, a beta tester and publisher of the Toronto-based *Mastering CorelDraw Journal,* version 5 should be cleaner. "Corel has listened intently to beta testers' gripes," says Dickman. "They have done longer and more thorough testing and made some requested changes in a week."

Fast Draw

Another unknown is speed. The company claims that version 5 will be noticeably faster, but it's also essentially upped the system requirements. You can run CorelDraw on a 386 with 8MB of RAM, but sanity dictates a 486 with 16MB and—if you opt for Ventura—a speedy hard disk with 50MB of free space.

The company vows that other tweaks will make Corel 5 skip along merrily. Redraws should be faster because 5 does more of its own memory management. It takes greater advantage of math coprocessors, which will speed functions such as redrawing transformed objects. And if you change part of the screen image by, say, opening a menu, Corel will *sometimes* redraw just the affected part of the screen.

Talk to the beta testers who live with CorelDraw every day, however, and they point to the mundane improvements in functionality that should make all Corel users more productive. For example, Corel's ruler finally displays tabs, so you can manipulate paragraphs on the spot. If you load a Corel file that uses fonts you lack, the program now lists installed fonts that closely match the missing ones. Another treasured addition, Type Assist, replaces abbreviations as you type and automatically capitalizes the names of days and the first letter of every sentence.

Publishing pros probably benefit the most from the Ventura 5 enhancements. The program finally looks and feels like a true Windows program. It matches CorelDraw's look from tool bar to floating menus and adds better file management, the ability to rotate text, and graphics text wrap around irregular objects.

CorelDraw has some key output enhancements too. It now automatically downloads PostScript fonts to your printer and, more important, embeds the correct font names in exported EPS files, which makes dealing with documents at your local service bureau a lot more predictable. Corel's color management feature lets you match colors accurately from one device (such as a monitor) to another (such as a color printer). You can also preview color separations and even Kodak Photo CD images and do some color correction. However, CorelDraw 5 still lacks some typographic basics: tracking, a sharp justification algorithm, and long-document features such as automatic page numbering.

All of which begs the ultimate question: Should you upgrade to 5? "If [5's] broke, the company will always fix it," says a warily optimistic Dickman. "Just remember that Corel is like that old quote about the dog walking on its hind legs. It doesn't do it very well, but you're surprised it does it at all."

—Robert Luhn

CorelDraw 5

Powerful desktop publishing and graphics program.
Key Features: Free Ventura Publisher 5 option • More consistent interface • Lens and masking tools • Better font handling • The usual surfeit of fonts and clip art
Pricing: floppy format $895, CD format $695; upgrade prices vary
Availability: Immediate
Corel Corp., 800/772-6735, 613/728-8200
Reader service no. 744

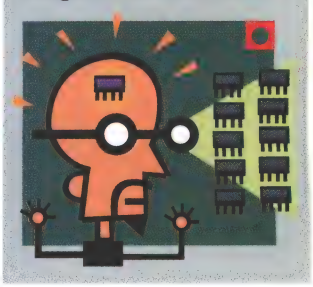
New Memory Chips Speed Systems

A performance bottleneck in your PC is about to be history.

A new generation of memory chips called RDRAM is shipping. They perform up to ten times faster than standard DRAM chips and will dramatically improve system and graphics controller performance and eliminate the need for CPU caches.

Based on technology developed by Rambus of Mountain View, California, an RDRAM is a standard DRAM chip with a special interface. A single RDRAM moves data over the 8-bit Rambus at 500 MHz, yielding a transfer rate of 500MB per second—as fast as a conventional SRAM cache, three to five times faster than VRAM on a graphics controller, and six to ten times faster than DRAM-based main memory.

NEC and Rambus expect to see graphics boards using RDRAMs in the second half of this year. NEC initially will offer RDRAMs to hardware developers for about 20 percent more than standard DRAMs, so the fast chips should not significantly affect the cost of new systems and devices. We'll see RDRAMs mounted directly on system boards, adapters, and SIMMs or soldered onto modules alongside their controllers.



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Rockin' Good Software: The PC Takes On MTV

Multibillion-dollar companies associated with music, film, television, and publishing are rapidly moving into the software market. Their goal? To ride the surge in demand for CD ROM drives. "Hollywood is rampant capitalism. They sniff a good business opportunity," says Julie Schwerin, president of Info-Tech, a market research firm in Woodstock, Vermont.

Interactive CD ROMs provide a new venue for the entertainment industry and an opportunity to repackage properties. The market is growing fast. CD ROM drive sales increased 155 percent between 1992 and 1993, says Schwerin. "Every computer will have a CD ROM drive by the end of the century."

RANDY KOMISAR, PRESIDENT AND CEO OF LUCASARTS ENTERTAINMENT, usurps the pilot's seat in the interactive CD ROM Rebel Assault.

The Rockin' PC

The pioneers in this electronic rush include rock legends Pete Townshend (of *Tommy*), ☥ (the performer previously known as Prince), Peter Gabriel, David Bowie, Todd Rundgren, and even (posthumously) John Lennon and Elvis, who are appearing on CD ROMs that cross the interactive boundaries between watching, listening, and playing.

These stars and the entertainment industry hope to transform your computer into a multifunctional device—part business tool, part classroom, and part rumpus room, where you'll interact with music videos and take part in role-playing adventure games featuring some well-known Hollywood names. The first steps are under way—getting talent you recognize onto CD ROMs. To make this possible, the American Federation of Television and Radio Artists has already rewritten its contract as well as its pay rates to encompass interactive CD ROM titles. In the meantime, record companies and Hollywood studios are making deals and signing up partners.

LUCASARTS' REBEL ASSAULT uses a combination of film from the Star Wars movies and computer animation to create realistic game play.

Tom McGrew, vice president of market development and product planning for Compton's New Media—one of the largest developers of CD ROM titles—says, "What we are seeing here is the consumerization of the PC."

Everyone involved—from Silicon Valley to Hollywood—is trying to figure out what to do with interactive. ☥ and Peter Gabriel are behind two projects that push the interactive listening experience.

The Gabriel disk allows you to play instruments from around the world, take a visual tour of Gabriel's music studios, and remix his records. The interactive disk from ☥ is a graphic journey, where solving puzzles uncovers ☥ videos and other goodies from the artist.

Like early films and the first newsletters created with desktop publishing packages, the current interactive titles are closer to rough cuts than to a finished art form. "Look at the birth of any new art form. It takes years for people to understand what the medium is about," explains Greg Roach, artistic director and founder of Hyperbole Studios, makers of the interactive film Quantum Gate. He points out that early films were exciting to audiences of the day, but most look flat and static to modern viewers.

Interactive Hip

What is clear is that Hollywood thinks it's hip to be interactive. Thanks to the hype surrounding the information superhighway and interactive TV, everyone wants to interact now. But the infrastructure for broadband two-way communication that interactive cable television requires doesn't yet exist. CD ROM does, and it allows the entertainment industry to hone its interactive skills. Not that CD ROMs will to go the way of the eight-track tape the minute we connect our PCs to the highway. Craig Moody, executive vice president of Time Warner Interactive Group, says, "The CD ROM is here to stay.

ROBERT HOLMGREN

The hit the road

Now there's a great new way to live off the LAN. Whether you're heading out of town or just heading home, LAN Distance lets you easily connect to your office network from your Windows™ or OS/2® remote PC.

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How they compare:	IBM LAN Distance	DCA Remote LAN Node	Shiva LANRover	Novell NetWare Connect
Connectivity Options				
Remote to LAN	Yes	Yes	Yes	Yes
Remote to Remote	Yes	No	No	No
LAN to Remote	Yes	No	No	Yes
LAN to LAN	Yes	No	No	Yes
Remote Connectivity Sync, ISDN, X.25 (In addition to ASYNC)	Yes	No	No	Yes
LAN Application Interfaces NetBIOS, NetBEUI, 802.2 (In addition to IP and IPX)	Yes	Yes	Yes	No
Security WS Addr., Sec. Admin., Logon Policies, Logon Day/Time (In addition to User ID, Password and Callback)	Yes	No	No	No

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Continued from page 66

Think of the information superhighway as another way to preview titles—like renting or going to a movie. There [will still be] a desire to own it."

Limited Access

At the moment, however, there isn't much to own. LucasArts, Broderbund, Rhino Records, 7th Level, Compton's, Hyperbole, Access, and a few others are making games and music titles that use video, real actors and musicians, and tricks of the trade to make you feel you're participating. "We use real film in Rebel Assault—to set the mood and to cut to scenes. We use video to tell the story and animation to allow the player to interact," explains Randy Komisar, president and CEO of LucasArts Entertainment. But most current offerings fall short of compelling.

A lot of what we'll see first from Hollywood will involve incremental merchandising. Most studios own a book publishing company. So they'll develop films, books, and interactive CDs concurrently. Take the Discovery Channel, for example. When it aired a documentary last Memorial Day about the World War II invasion of Normandy, it also marketed a CD ROM that allowed viewers to explore the subject interactively. And it sold a book that served as a companion to the CD. By marketing all three media together, it increased sales of each. And the company plans to do the same with its upcoming CD ROM on sharks. But merchandising is just the beginning—a way to gain a presence.

Hollywood's influence will be "as much about distribution and marketing as about production," explains Eric Doctorow, president of domestic home video at Paramount Studios. Joey Tamer, who puts together CD ROM distribution deals between Hollywood, Silicon Valley, and New York, elaborates: "Hollywood takes distribution for granted. You'll find titles in video stores, bookstores, supermarkets, record stores, through direct mail, by club—everywhere. And prices will come down dramatically."

Once consumers are sold on CD ROMs, the powerful influence of the entertainment industry may seep into business applications. "You're going to see higher production values, better graphics, and better sound," says LucasArts' Komisar. And this is true not just for entertainment titles but for the applications you use everyday. Compton plans to include a well-known actor (no name is available until a contract is signed) in the next version of its encyclopedia. When you click the encyclopedia's help button, the cursor turns into a question mark. Point that question mark at anything on the screen, and the actor explains it. That device is likely to appear elsewhere. "Before, you had thick manuals, and you had to learn. Now, you will have thin manuals and a talking guide on the screen," says Compton's McGrew.

NORMANDY: THE GREAT CRUSADE is an interactive documentary that offers more depth than its television counterpart.

The consumerization of software should also produce software that's more usable and has fewer bugs. According to Janice Maloney, senior editor at *Technology & Media*, a San Francisco–based newsletter that tracks the computer industry, mainstream consumers won't stand for the incompatibilities that diehard computer fans tolerate. "If consumers have problems, they'll return the CD ROM to the store they bought it from," Maloney says.

THE ARTIST FORMERLY KNOWN AS PRINCE joins the ranks of musicians who are bringing their music to interactive CD ROMs.

Another thing that consumers won't tolerate is high prices—and that dynamic could be good for everyone. "The more consumers buy interactive multimedia, the more the price will come down, and the more affordable [interactive multimedia] will be for business," says InfoTech's Schwerin.

No More Air Guitar

If consumer interest leads to lower prices, better compatibility, and widespread use of CD ROM drives, opportunities for business abound in the form of tools for creating and using multimedia presentations plus an easy delivery mechanism. Time Warner's Moody says, "I don't see [the time] being too far off when businesses will make interactive CD ROMS" for internal distribution and use.

So, will Arnold Schwarzenegger help you avoid being terminated over the intricacies of Excel 8.0? Maybe not. But the next CD you buy may play in your PC as well as in your entertainment center; it will push the interactive listening experience beyond air guitar to involve you actively in the creation of video music.

—Christina Wood

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• VESA local bus	• VESA local bus
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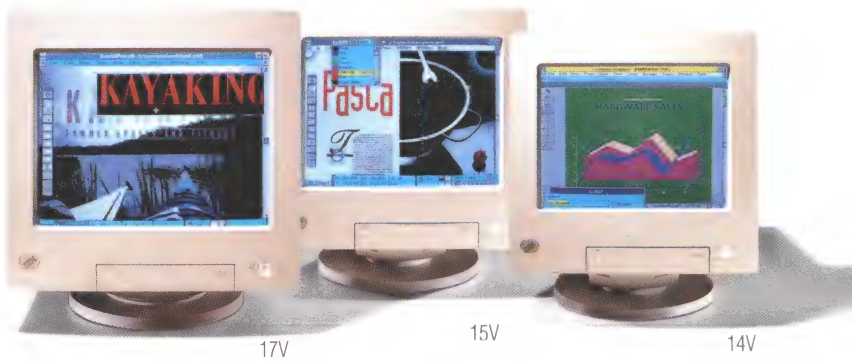

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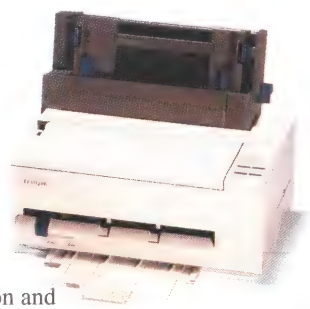

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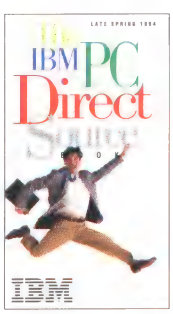

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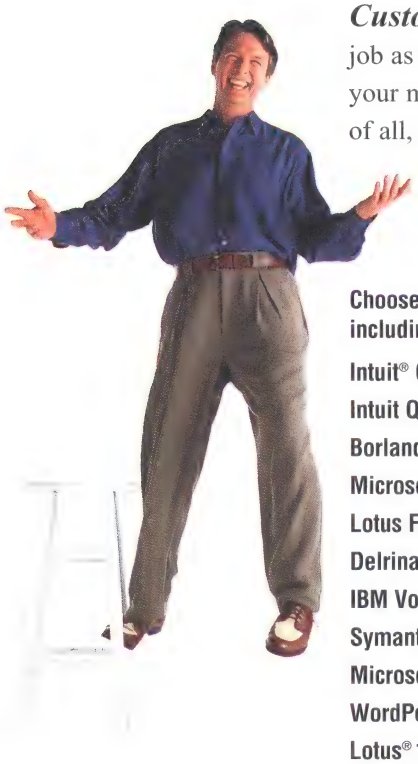

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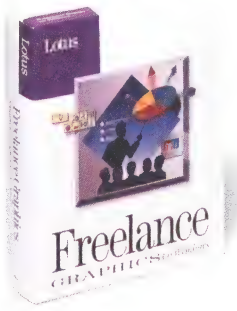

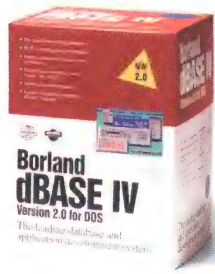

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Networking

A PC WORLD MONTHLY SECTION ON GETTING THE MOST FROM YOUR NETWORK

8 Tricks for Spreadsheets on a Net

Today's Windows spreadsheets let you do everything from crunching budgets to tracking customers to generating fancy reports. And when you put those spreadsheets on a network, you can do even more. In fact, the current crop makes it reasonably easy to share information with your co-workers and to tap other network resources. Here are the eight coolest tricks that Excel 5.0 for Windows, 1-2-3 release 4.01 for Windows, and Quattro Pro 5.0 for Windows bring to network users.

1. Run your spreadsheet off the net.

Windows products promise simplicity and ease of use, but to make the promise a reality requires acres of disk space. The average Windows spreadsheet demands at least 23MB. Combine that with a Windows word processor and all your worksheets and documents, and you're suddenly out of room.

So why not run the spreadsheet software right off the net? It'll save space on your workstation—and save your network administrator a lot of headaches.

Excel installs smoothly on network drives and provides flexible options for workstation installation. For example, administrators can create script files that install the software with little or no input from users.

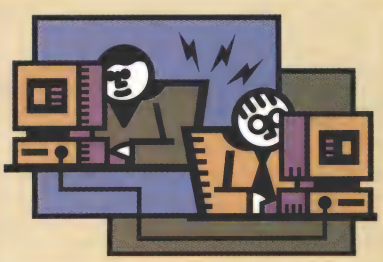
Although 1-2-3 doesn't provide the ability to automate the installation for the end user, it does include an additional program that makes the administrator's life a little easier: The Licenser provides valuable information on usage levels, including the number of concurrent users and the number of failed log-ins that occur when the license agreement's limit is reached.

Both the Standard Edition and the Workgroup Edition of Quattro Pro can be installed on a network, but the Workgroup Edition provides additional functions and features for both the administrator and the end user. Using the network deployment feature, for example, the administrator can specify users' default application settings as well as which users are allowed concurrent access to the software.

2. Link your work group's files.

Each spreadsheet enables you to pull data from several files into a single file. By creating dynamic links to worksheets on the network, work-group members can build models based on other members' data.

For example, a divisional director can place data-entry worksheet files for each of several department heads on a network drive. The department heads load their respective worksheets and enter their data.



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The director can then build and locally store a summary workbook, which contains links to the departmental data in each of the separate worksheets.

Excel, 1-2-3, and Quattro Pro allow you to build file-linking formulas, which refer to cells in other worksheet files. These links can refer to cells in worksheets that are on your own hard drive or on the network.

When you open a worksheet that contains links to other files, both Excel and Quattro Pro display a dialog box asking if you want them to update the links. Furthermore, you can open the worksheets referenced in the formulas quickly and easily. In 1-2-3, file links are automatically updated, but you must manually open the worksheet files that contain the linked data.

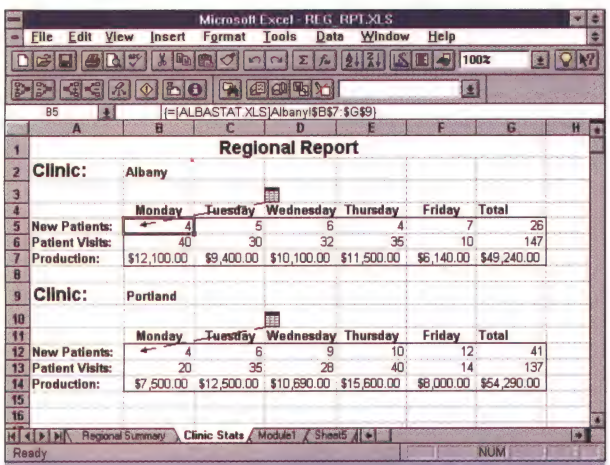


FIGURE 1: CREATE FILE-LINKING FORMULAS to link data across the net. Excel's trace facility shows external links.

As easy as it is to link worksheet data, there's nothing more confusing than trying to keep track of the links. Both 1-2-3's and Excel's auditing commands enable you to track and maintain worksheet links across a net. Quattro Pro's trace facility locates only the source of errors, not the occurrence of file-linking formulas.

1-2-3's *Audit•Tools* command shows both file links and DDE links locally or on the network. (Excel and Quattro don't distinguish between these two types of links.) 1-2-3 either highlights the cells containing links or produces a printable report listing the links.

Excel provides a more graphical trace facility. When you click the Precedent or Dependent button on the Auditing tool bar, Excel displays arrows showing the origins of data links in the worksheet, including references to other files (see **FIGURE 1**). Double-clicking the trace arrows brings up a Go To dialog box from which you can jump to the reference range. If you double-click a cell with an external file reference, Excel will open the file and select the referenced cell, no matter where it is stored.

3. Bulletproof your shared worksheets.

Spreadsheet security has always been an issue, but for the network user, it's critical. Fortunately, there are various levels of protection that you can apply to send out a virtually bulletproof spreadsheet.

Excel provides security at the worksheet, workbook, and cell levels. You can assign two types of password protection to a worksheet: You can prevent users lacking a password from opening a file, or you can let them open the file but prohibit them from saving the file without the password. You can also protect a worksheet by adding a "read-only recommended" warning, though this doesn't prohibit users from making changes.

In 1-2-3 you can password-protect a worksheet so that users without the assigned password can't open it, or you can seal the file so that such users can view the worksheet but are not allowed to change cell contents, styles, or other settings.

Quattro Pro assigns password protection at the notebook level; you can't password-protect an individual page in the notebook, but you can give a notebook high, medium, low, or no password protection.

Each level defines what users can and can't change in a notebook with an assigned password. The high protection level restricts users from opening the notebook unless they know the password. The medium level prevents users from viewing hidden notebooks without a password. The low security level restricts users from modifying worksheet formulas.

Unfortunately, when you want to remove password protection from a notebook with a low or medium security level, you have to close the notebook file, exit Quattro Pro, and then restart the program.

4. Bring files together in a work space.

Keeping several files open on your desktop is one of the advantages of Windows. Excel and Quattro Pro allow you to save a set of open files and reopen all of them with one command. This is particularly handy when some files are local and others reside on shared drives. In Excel use the *File•Save Workspace* command; in Quattro Pro use *File•Workspace•Save*.

5. Annotate cells in shared worksheets.

When multiple users are chugging away on a worksheet, it's handy to annotate cell entries. Although annotation is common in word processors, Excel is the only spreadsheet that offers the feature.

To annotate a cell in Excel, you simply select the cell and choose the *Insert•Note* command. The Cell Note dialog box lists all of the existing cell notes in the worksheet and displays an entry box for entering or editing note text. Cells with attached notes are marked with a small colored box in the upper right corner of the cell. You can view the note by double-clicking a cell or using the *Insert•Note* command.

Both Quattro Pro and 1-2-3 provide a workaround of sorts. When you enter data in a cell, type a semicolon (;) at the end of the entry and then enter the note text. When you use this technique to annotate formulas, it does not affect the result of the formula in the cell. When you select a cell that contains a note such as this, Quattro Pro and 1-2-3 display the text, along with the formula, in the formula bar.

6. Save everybody's version in one worksheet.

Until recently, whenever you and your coworkers collaborated on a worksheet, each person saved his or her version of the data

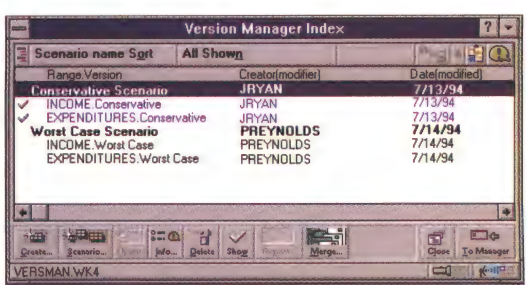


FIGURE 2: 1-2-3's VERSION MANAGER INDEX helps you manage and merge versions of your data.

in a separate file; then some poor soul had to retype the numbers into a master file. In the end, nobody really knew the assumptions behind the final consolidated version. All three spreadsheets address this problem by providing some form of what-if, or scenario, manager.

In 1-2-3, users can enter and save different sets of worksheet data as a version within the same file. You can then quickly view each version of the data without changing the underlying data. Each version is identified by the name of its creator, a date, and a time stamp. You can also combine multiple versions to create a single scenario. Say, for example, you're the head of a finance department and you want to create a model showing expected expenditures and revenue. First, you would enter several sets of this data as versions. Then you could create a scenario called Best Case using the low-expenditure numbers and the high-return numbers. Another scenario called Worst Case would contain the high-expenditure and low-return versions.

1-2-3 provides two tools for keeping track of versions and scenarios in a worksheet: The Version Manager enables you to manage one version at a time, and the Version Manager Index (shown in **FIGURE 2**) manages multiple versions and scenarios, and even merges versions from multiple worksheets.

In Excel, a Scenario is a named group of input values (Lotus calls this a Version). You can create, edit, protect, and display scenarios. You can also generate reports summarizing all the scenarios in a worksheet. Network users can either enter their versions into shared workbooks, or enter them in different workbooks and then use Excel's scenario management tool to merge the versions into a single workbook. You are limited to 32 cells for each version, which can be confining on large worksheets.

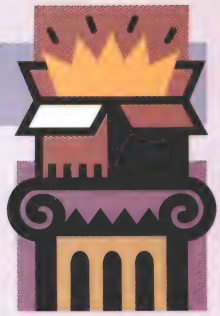
Quattro Pro also provides a full-function Scenario Manager that handles multiple scenarios of any size, including entire notebooks. As in 1-2-3, you can save multiple scenarios as a group, and view the contents of each group separately.

7. Store files on the net.

One of the big pluses of a network is the extra storage space it offers for your files (particularly large files) once you've convinced your network administrator to allocate the space to you. You also can share files with others in a common directory.

JAMES KRAUS

Product of the Month



Modem Assist Plus Dials to Save Dollars

When it comes to sharing, modems are as bad as two-year-olds: They won't do it gracefully, and often they won't do it at all. Synergy Solutions' Modem Assist Plus 3.0 package overcomes this problem, letting everyone on a NetWare net access a modem as easily as they access a network hard drive.

This ability can save you big bucks, especially if you're on a modern digital phone system that can't support direct modem connections and needs separate analog lines at each PC. You save line installation costs and monthly charges by setting up a pool with a network modem server, since fewer lines are needed when they are all shared. Even a small office with a single modem can benefit from Modem Assist Plus.

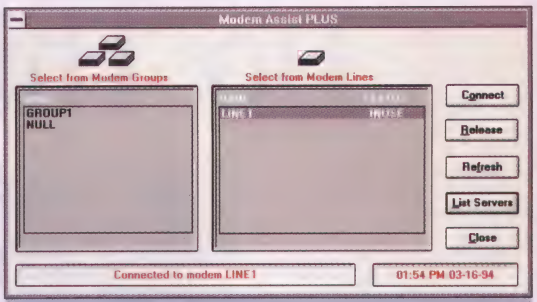
Modem Assist Plus installs easily on client PCs and either a dedicated modem server or your network server, and its standard configuration should work for most users. On the modem server, a DOS utility called Monitor watches over connections and provides information about individual connections (such as which client is using the line, and the number of bytes sent and received) and the status of the phone lines.

On each client PC, you dedicate a serial port (usually COM4) to Modem Assist Plus and then set your regular DOS or Windows communications program to use that port. (Modem Assist Plus comes with a simple communications program, TERM, that probably won't replace your standard package.) The Windows client lets you select a modem line and shows when all lines are busy or when a line isn't answering.

We tested Kermit, the Windows Terminal, CompuServe's WinCIM, and America Online's Windows client, and all worked well with Modem Assist Plus. (Most competing modem-sharing products can't handle the America Online software.)

You can specify that modem lines use different transmission characteristics (for example, data/stop bits for a given online service), and you can set up groups for easier access to large modem pools. Modem Assist Plus handles inbound calls well, providing a password option for security.

The package lists for $695 per server and allows unlimited users and modems. For five or more modems, Synergy recommends a dedicated modem server with an 80386 or faster CPU and a serial device with the 16550 UART communications chip. Caution: The recommended hardware is crucial for optimal performance: Systems with 8250 chips (standard until a few years ago) are limited to a top speed of 9600 bps, which can drop to 2400 if the server is running Windows. Clients running Windows are limited to one terminal session at a time.



MODEM ASSIST PLUS'S WINDOWS CLIENT makes it easy to select a shared modem line.

Modem Assist Plus's configuration is quite simple, and the documentation is reasonably complete, although it's not entirely organized and not aimed at novices. Vital installation information is available only in the README files. And the Uninstall program deletes Modem Assist Plus program files but neglects to restore your original WIN.INI file, and it also fails to tell you to restore it. But despite these shortcomings, Modem Assist Plus is an overall good choice for network modem sharing.

—Peter Loshin

Peter Loshin is a network specialist in Brookline, Massachusetts.

Modem Assist Plus 3.0
Synergy Solutions Inc.
602/545-9797
Reader service no. 635

But for those of us who can lose a file on a 60MB hard disk, managing files that are floating around on 250MB local drives and gigabyte-size network drives is daunting. And flipping from an active worksheet to the File Manager and back is clumsy.

Neither 1-2-3 nor Quattro Pro offers integrated file management, but Excel provides an invaluable find-file option. The File•Find File command brings up a dialog box that allows you to specify drives to be searched, as well as search parameters such as file patterns, time stamps, summary information, and specific text within the file. Excel displays a list box of matching files when files are found. You can then copy, delete, or open the file directly from the Find File dialog box.

8. Send mail from your well-wired worksheet. Excel, 1-2-3, and Quattro Pro Workgroup Edition enable you to distribute data using electronic mail facilities. All three products work with both Microsoft Mail (and other Messaging Application Programming Interface—or MAPI—programs) and Lotus's cc:Mail (and other Vendor Independent Messaging—VIM—packages).

With Excel's *File•Send* command, you can mail and route workbooks to other users. Unfortunately, however, Excel doesn't let you send just a range of worksheet data; you must send the entire workbook. Mailing a workbook sends it on a one-way trip to the addressee, whereas routing sends it either sequentially to listed recipients or to all recipients at once. When a workbook is routed, the sender is kept informed as the workbook passes to each recipient. Routing can also specify a return trip, so that after the last person has finished viewing the file, it is automatically routed back to the sender.

1-2-3 doesn't provide routing but does offer more flexible interaction with mail services. You can send ranges, charts, drawn objects, and entire worksheet files. The *File•Send•Mail* command opens the Send Mail dialog box, from which the selected range or file can be sent. As an added bonus, if you're using Lotus Notes, you can save a 1-2-3 worksheet as a Notes file, then access it from a Notes database.

Quattro Pro's Object Exchange facility (OBEX) can act as an interface to E-mail systems, but it is capable of much greater cooperation with messaging services. OBEX acts as an intermediary between an individual user and messaging services such as MCI Mail, Novell's NetWare Message Handling Service (MHS), Microsoft Mail, and Lotus's cc:Mail.

OBEX handles both mailed and published objects. Mailed objects are simply sent to all named recipients. Published objects go to users who then have the option of subscribing to them.

Once a user subscribes to a published object by inserting it into a notebook, a dynamic link is established with the publisher. The next time a new edition of the object is published, OBEX automatically sends a copy to all subscribers. The new version is either automatically inserted into the notebook, replacing the previous version, or it waits to be manually inserted into the notebook by the subscriber.

—David Aden

David Aden is vice president of information systems for Sportsmed, Inc., a Boston-based provider of physical therapy services.

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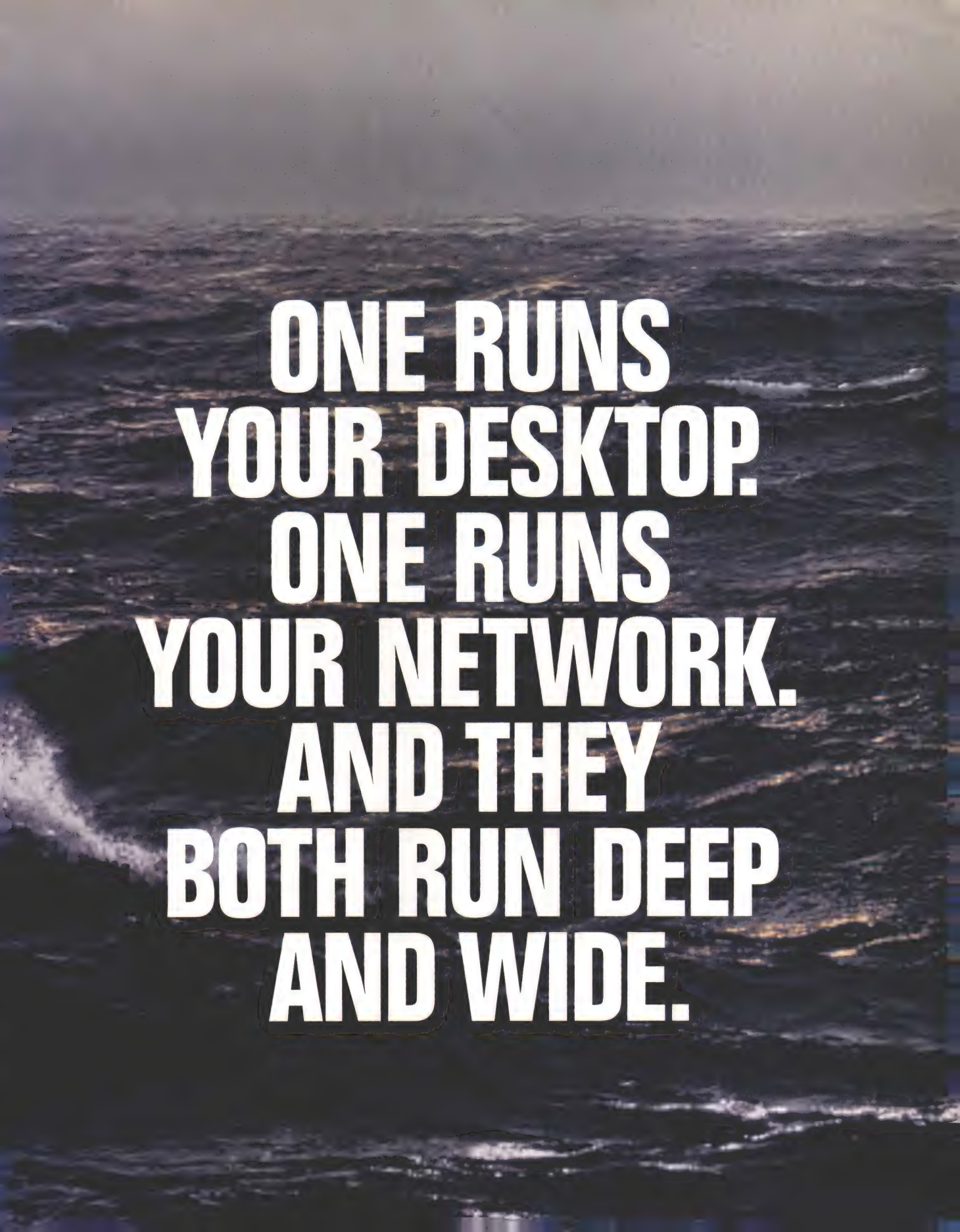
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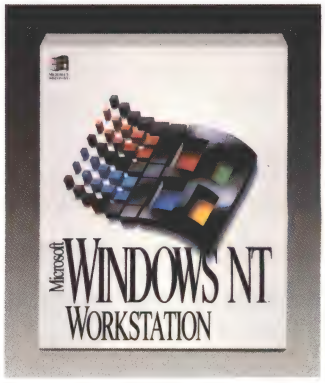

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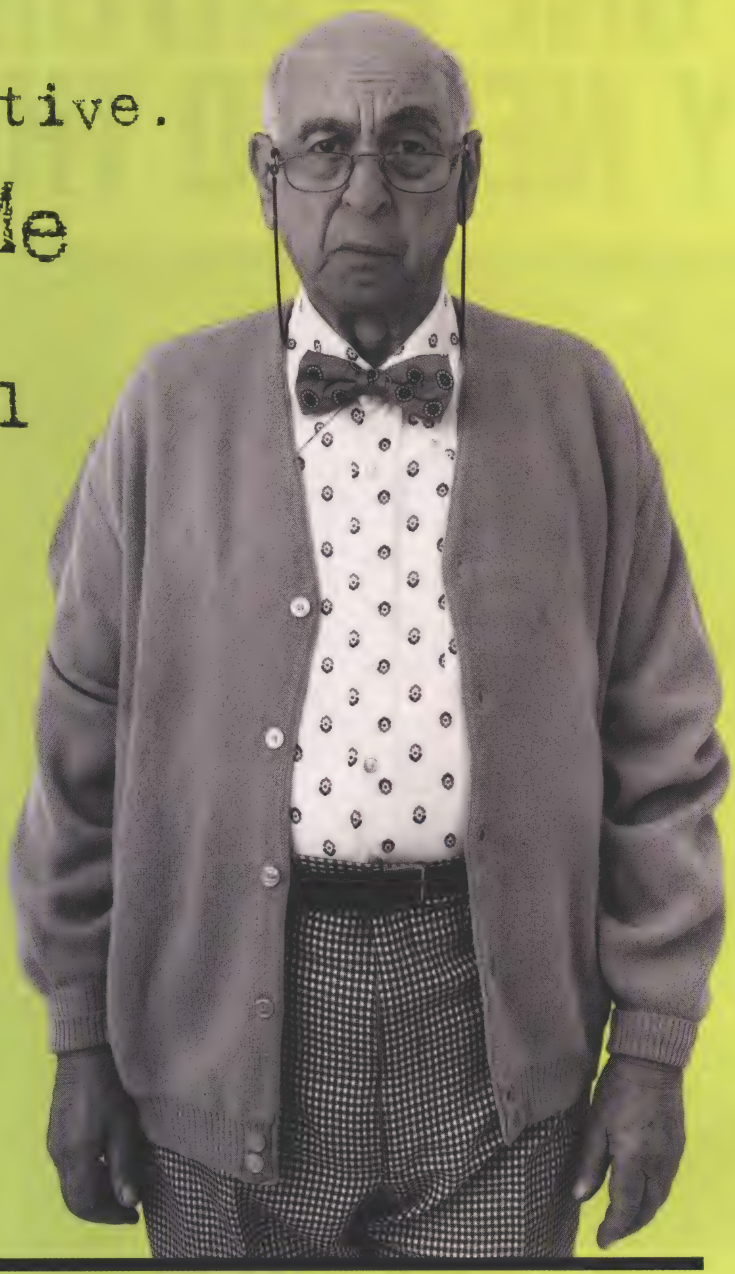

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Compaq's Latest Deskpros: Start of a Price War?

Compaq just launched a two-pronged assault on its competitors. The Houston PC vendor has introduced a new flagship line, the Deskpro XL, while reinforcing its existing midrange and low-end lines. The new XL models, with prices starting at $2599, cost hundreds of dollars less than the M-series machines they replace and include a number of significant enhancements. "This is the kind of machine that causes price wars," says James J. Greene, a research analyst at BIS Strategic Decisions.

Targeting the corporate market, the XLs offer CPUs ranging from a 50-MHz 486DX2 to a 66-MHz Pentium; 90-MHz and 100-MHz models will be introduced later.

COMPAQ'S INNOVATIVE DESKPRO XL SERIES features integrated ethernet and SCSI, enhanced graphics and Business Audio, plus Plug and Play support.

The War Machines

The Deskpro XLs feature an enhanced version of Compaq's proprietary QVision graphics. The top-of-the-line XL models boast QVision 2000, a graphics subsystem with 2MB of VRAM (not expandable). These systems can display 256 colors at 1280 by 1024 resolution, or 65,000 colors at 1024 by 768. Compaq says QVision 2000 performance is comparable to that of the fastest graphics accelerators on the market, but we could not verify this claim by press time.

The lower-end 50-MHz and 66-MHz 486DX2 XLs (with 270MB hard drives) offer midrange graphics performance via the QVision 1280/P subsystem. With 1MB of VRAM (expandable to 2MB), these systems can display 16 colors at 1280 by 1024 resolution, or 256 colors at 1024 by 768. Both versions of QVision support the VESA Advanced Feature Connector for use with high-speed multimedia video cards such as Sigma Design's Reel Magic.

The XLs are born to network: They feature a 32-bit LAN card running on a PCI local bus, Novell's Universal NetWare Client software preinstalled, and driver support for all major network operating systems. Another noteworthy improvement is Compaq's new Vocalyst keyboard. The device integrates a high-quality speaker and microphone into the keyboard, along with a mouse connector for users who wish to exploit the XL's ability to work as either a desktop or a deskside unit. Compaq has also enhanced its Business Audio voice recognition and sound playback system; you'll find better recognition and compression, as well as compatibility with the SoundBlaster standard.

In anticipation of Windows 4.0, due by year-end, the Deskpro XLs include BIOS support for the latest version of the Plug and Play specification. Developed by Compaq, Microsoft, and other industry leaders, this standard reportedly will make adding peripherals to your PC as easy as popping in a new card—no more fiddling with jumpers, switches, or IRQ and DMA channels.

Fast Disk Access

For high-speed disk performance, a 32-bit SCSI 2 interface is integrated onto the XL's 32-bit ethernet card. Hard drive sizes range from 170MB to a capacious 2.1GB. The system comes with five expansion slots and five drive bays. The 486 and 60-MHz Pentium XLs have 8MB of RAM—expandable to 128MB on the 486 models, 136MB on the 60-MHz Pentium. The 66-MHz Pentium has 16MB RAM, which is expandable to 144MB.

Each Deskpro XL is preloaded with Windows 3.11, MS-DOS 6.21, Compaq's TabWorks for Windows shell, Windows Sound System 2.0, and various Compaq utilities. The lineup includes increased support for the Energy Star program, which calls for idle-time power-saving features. You can configure XL components (such as the CPU, the hard drive, and the monitor) to power down after a specified period of inactivity.

Compaq has also enhanced its midrange Deskpro XE line with a 100-MHz DX4 model, which carries a street price of $2699 when configured with 8MB RAM and a 270MB hard drive. The entry-level ProLinea line boasts improved graphics, Energy Star compliance, and Plug and Play compatibility.

—Joe Abernathy

Compaq Deskpro XL series

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Reader service no. 739

Gateway Notes Bring Dual-Scan Color to the Big Screen

If you want a color notebook with a large screen but can't afford the additional weight or cost of an active-matrix display, Gateway's newest dual-scan portable warrants a look. The ColorBook DX4-75 boasts a 10.3-inch dual-scan color screen—the largest available—in a lightweight package at a competitive price.

At press time, the $3495 ColorBook was one of the lowest-priced systems powered by Intel's new clock-tripled 75-MHz DX4 chip. But don't let the price fool you. The system is packed with 8MB RAM, expandable to 20MB, and includes a 250MB removable hard drive. The notebook also incorporates a pair of PCMCIA Type II slots and local bus video with 512K of DRAM. An integrated trackball pulls out from below the keyboard and locks along the front edge of the notebook.

If you're comparing this system to an active-matrix notebook, the ColorBook note offers some real pluses. At 5.7 pounds, it's considerably lighter than the typical 8-pound active-matrix note. The price is light too: Active-matrix notes usually cost about $4500—$1000 more than the ColorBook DX4-75.

The ColorBook screen looks very sharp—one of the better dual-scan displays I've seen. However, dual-scan screens can't match active matrix for some tasks. For example, if you use your notebook for small-group presentations, you'll want the brightness and wider viewing angles of active matrix.

In *PC World* tests, the system performed comparably to other DX4-75 notebooks. One interesting finding: Although you'd expect a 75-MHz DX4 to be faster than a 66-MHz DX2 notebook, it's not. The Gateway ColorBook DX4-75 was 22 percent slower than the fastest DX2-66 notebook we've tested. (One reason—the clock-tripled 75-MHz DX4 uses a 25-MHz motherboard, while the 66-MHz DX2 uses a faster 33-MHz one.)

The upside of the speed trade-off: DX4-75 notebooks are typically less expensive than the DX2-66 notes. Also, a 75-MHz DX4 processor is a 3.3-volt chip and draws less power than a 66-MHz DX2. You can have a larger screen without sacrificing much battery life.

Speaking of battery life, the ColorBook includes a suspend/resume feature, and a power management menu allows you to adjust the power consumption of the CPU, the hard disk, and other components. The notebook uses a nickel–metal-hydride battery. Gateway claims that the system runs for 2 hours without any power management, 3½ hours with maximum power-saving settings.

Although the ColorBook is one of the first DX4-75 notebooks with a 10.3-inch dual-scan color display, more are expected this spring. Watch prices closely as the competition heats up.

—Laurianne McLaughlin

ColorBook DX4-75

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GATEWAY 2000'S COLORBOOK DX4-75 sports a large 10.3-inch dual-scan color screen and a high-performance 75-MHz DX4 processor.

2x CD ROM Drive Uses Parallel Port

If you hanker for a fast CD ROM drive but don't want to hassle with add-in cards, MicroSolutions' new double-speed $499 CD ROM Backpack may hold the answer. Installation couldn't be simpler: Plug the Backpack into your parallel port, plug your printer into the Backpack, install some software, and you're off.

The Backpack has a respectable 250ms average access speed and is compatible with all current CD ROM standards, including multisession Photo CD. And since the Backpack has a motor-driven tray, you don't need those annoying caddies. The unit also has headphone and line-out jacks for connection to sound cards and works with DOS and OS/2.

But there's a caveat. MicroSolutions makes excellent parallel-port peripherals, but I ran into a problem that isn't the company's fault: Parallel ports in many older PCs are unidirectional and can't handle high-speed parallel-port data. To get maximum performance (more than 300 kilobits per second) from the Backpack, you need an Enhanced Parallel Port (EPP), usually found only in current top-tier systems (for example, in many Compaq desktops and portables). While you can buy add-in EPPs for desktop systems, they're pricey and difficult to find. Unfortunately, notebook users are usually stuck with the parallel port that comes with their system.

—Stan Miastkowski

Double-Speed CD ROM Backpack

Parallel-port CD ROM drive meets all multimedia specs.
MicroSolutions
800/890-7227 ext. 200,
815/756-2928 (fax)
List price: $499
Reader service no. 741

Trackball Alternative: Let Your Finger Do the Mousing

If you're still searching for the perfect mouse substitute for your notebook, Cirque Corporation's $99 GlidePoint offers an intriguing option in the form of a miniature touch-sensitive panel that you control with your fingertip.

The GlidePoint resembles a small makeup case in size and shape. The Microsoft Mouse–compatible device plugs into a notebook's PS/2 port. Run your finger lightly over its 2¼- by 1½-inch surface, and the cursor follows along; tapping on the surface is equivalent to clicking a mouse's left button. Or use your thumb to click left and right buttons located below the touch panel.

The unit's design offers several advantages over trackballs. Since it's small and flat, it stows easily in a crowded briefcase. It doesn't demand much room on airplane tray tables or in other cramped workspaces. You can even prop it on the surface of your open notebook so it occupies no additional real estate. And while trackballs are prone to pick up oils and dust—resulting in sticky performance and a need for frequent cleaning—GlidePoint should require little in the way of maintenance.

Extended use of GlidePoint also proved gentler on my hand than portable trackballs, which often leave my thumb sore. Moving my finger across such a tiny surface took some practice; at first the cursor tended to skid past my intended target. Within a few hours though—helped along by Cirque's handy tutorial—I was able to maneuver quickly and precisely around the screen. The unit's ergonomics falter only in the location of the right button; reaching it while keeping my finger in place wasn't easy.

–Harry McCracken

GlidePoint

Touch-sensitive mouse substitute for notebook PCs.
Cirque Corp.
800/454-3375,
801/467-0208 (fax)
List price: $99
Reader service no. 742

CIRQUE'S GLIDEPOINT gives users of portable computers a unique touch-sensitive alternative to mice and trackballs.

Control Network Printers From Your Desk With MarkVision

You don't have to trek down the hallway anymore just to check a print job. Lexmark's new network print management utility, MarkVision, allows bidirectional communications between Windows PCs and printers on a Novell NetWare LAN. You can select a paper tray, receive paper-jam alerts, and more without leaving your PC. Lexmark is one of the first to offer this capability.

MarkVision is the most significant improvement in a set of software enhancements Lexmark has made to its IBM 4039 LaserPrinter family of network printers. The company has also added support for PCL 5e and PostScript Level II.

Lexmark 4039 printers with these enhancements will be called 4039 Plus models. The $1749 12R Plus prints 12 pages per minute (ppm) at 300 dots per inch (dpi), or 8 ppm at 600 dpi. It includes 4MB RAM (expandable to 16MB) and holds 200 sheets (800 with additional trays). The $2299 12L Plus has the same specs but holds 500 sheets standard (1100 with additional trays). The $3399 top-of-line 16L provides 16-ppm speed at 300 dpi, 8 ppm at 600 dpi. The 10-ppm 4039 10R and 10R Duplex models offer the Plus features as a $359 upgrade. Current 4039 owners can upgrade to the Plus features by adding a SIMM module to the printer and installing new software drivers for a cost of $359.

When you open MarkVision from Program Manager, you see a graphical depiction of the printer, along with a status report. MarkVision notifies you if the printer has a problem, for example, if it's out of paper, low on toner, or jammed. In addition, you can view printer configuration information, see if jobs are lined up, and select a paper tray. You do all this via MarkVision's on-screen representation of the printer's operator panel. A network administrator can change settings on any printer anywhere on the network from his or her PC.

Right now, MarkVision works with Novell NetWare 3.11, 3.12, and 4.0. (Administrators using NetWare 4.0 should note that the software lacks full support for NetWare directory services, a capability Lexmark plans to add within the year.) Support is planned for Apple Macintosh System 7 later this year and for IBM OS/2, IBM LAN Server, and Microsoft Windows NT in 1995.

–Laurianne McLaughlin

Lexmark 4039 Plus printers

Windows users can monitor network printer jobs from their desks.
Lexmark Int'l
800/358-5835
List price: 12R Plus $1749, 12L Plus $2299, 16L Plus $3399; upgrade for existing 4039 printers $359
Reader service no. 743

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Forget the Mouse, Type Commands in Windows

Confess, Windows users: Sometimes it's just easier to *type* a command. Unfortunately, Windows' two kinds of command prompts leave a lot to be desired. The DOS prompt can't run Windows programs or associated data files. Windows' cryptic File•Run command lacks a list of recently used commands for easy retrieval—and it doesn't understand such DOS commands as COPY, VER, and DEL. Furthermore, neither of these options can run a Windows application from a batch file.

Three utilities—Phar Lap's FrontRunner, Wesson International's Praxim, and Bardon Data Systems' SmilerShell Pro 2.0—give you a best-of-both-worlds prompt in Windows (other such utilities are available). I looked at a late prerelease version of Phar Lap FrontRunner and shipping copies of Praxim and SmilerShell Pro.

Most Windows-prompt programs merely emulate DOS's COMMAND.COM, but Phar Lap FrontRunner puts the real thing in a scrollable window with cut-and-paste capabilities. This special DOS session knows about Windows, so you can launch Windows programs and data files (through Windows associations). For instance, typing WIN.INI loads the file into Notepad, because the INI extension is associated with that program.

FrontRunner does more with batch files than its competitors do. Not only can you run Windows programs in batch files, but you can add Windows-specific commands that turn your batch files into graphical, interactive programs. FrontRunner also acts as a decent Windows shell, with cascading menus for accessing Program Manager items, and a configurable icon bar that allows you to launch your favorite programs quickly.

FrontRunner retails for $139, making it far and away the most expensive of the three utilities. Unless you really need to create fancy batch files in Windows, it probably isn't worth the price.

Great Shell, Better Prompt

Wesson's Praxim is what a command prompt in a graphical environment should be. In one small window, Praxim features a command line and a scrolling pane that displays the results of your typed commands. This window is fully mousable—double-click a file name listed after a DIR command, and you launch the file. In addition to all this, Praxim is a complete Windows shell with launch pads, File Manager windows, and some drag-and-drop tools.

Praxim's command line has it all. You launch a program by typing its file name or an associated data file name. If the file is listed in Praxim's Program Manager, it doesn't even have to be in AUTOEXEC.BAT's PATH statement. In fact, if you type a Program Manager item name in brackets—for example, [Paradox for Windows]—Praxim launches the program.

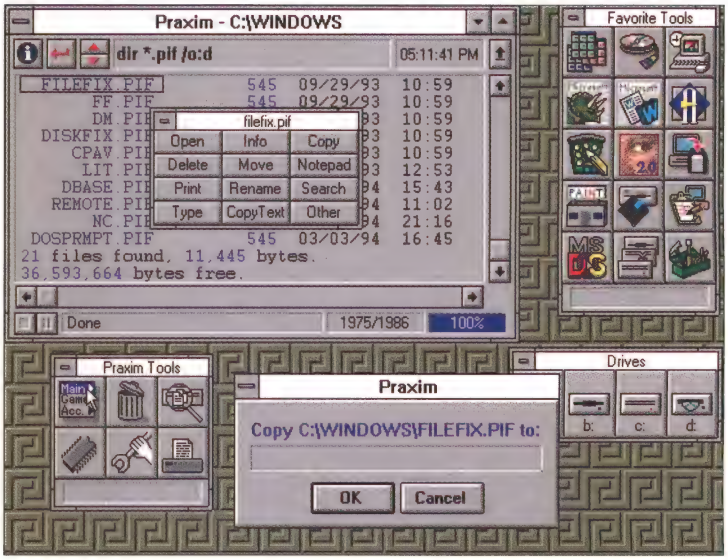
Praxim can launch Windows apps through its own batch files, although it doesn't have FrontRunner's impressive batch capabilities. And Praxim doesn't make you type the full directory name or path when you change directories; the first few letters are enough. This could be the best shell for people who like to point, click, and type.

The Little Prompt That Could

Bardon's SmilerShell Pro is small, simple, inexpensive, and easy to launch. That's because the program puts a small icon that brings up the SmilerShell prompt in your active window's title bar. Unfortunately, the prompt doesn't disappear when you enter a command; rather, it stays on screen (and on top of your active window, no less) until you send it away with a mouse click.

Like Praxim, SmilerShell allows you to assign aliases as shortcuts and to change directories by typing a few letters. SmilerShell Pro 2.1, which may have been released by the time you read this article, will support Windows file associations and offer Praxim-like mousable file lists. SmilerShell doesn't have Praxim's power, but it offers a lot for $29.95.

—Lincoln Spector



PRAXIM'S COOL TOOLS: The command line and scroll window at the upper left give you point-and-click access to the files listed in the scroll box.

Phar Lap FrontRunner

Expensive Windows shell improves DOS command line.
Phar Lap
617/661-1510,
617/661-2972 (fax)
List price: $139
Reader service no. 670

Praxim

DOS-like command line; lacks Phar Lap's batch features.
Wesson Int'l
800/634-9808
512/328-7838 (fax)
List price: $49.95
Reader service no. 671

SmilerShell Pro 2.0

Small, inexpensive command line program doesn't understand Windows associations.
Bardon Data Systems
800/242-4775,
510/526-8470.
List price: $29.95
Reader service no. 672

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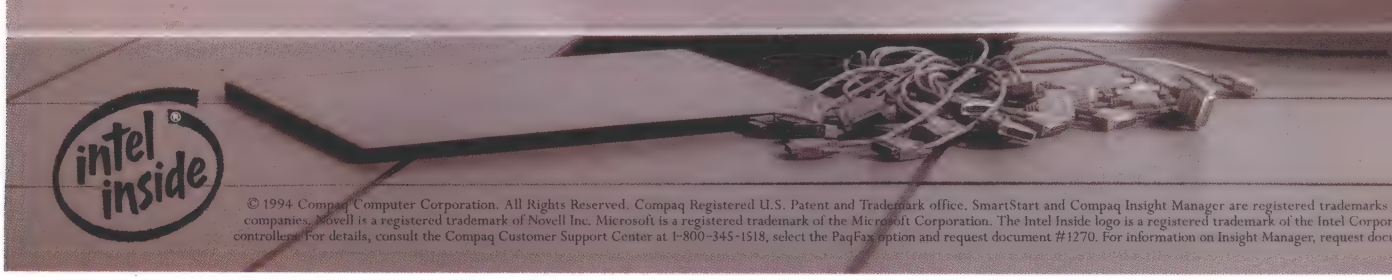

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Super Show & Tell: Painless Multimedia Presentations

Super Show & Tell 1.1

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Ask Me Multimedia Inc.
800/275-6311,
612/531-0603
List price: $149.95
Reader service no. 673

Ask Me Multimedia's Super Show & Tell 1.1 makes it easier to combine graphics, animation, sound, and video into an electronic slide show. This entry-level package assumes you have little or no multimedia presentation experience. The program's straightforward, completely visual interface makes it child's play to combine media clips into a comprehensive presentation. The tools you need to splice together a self-running or interactive presentation are on screen at all times, taking much of the mystery out of the process.

Unlike Macromedia's Action and other comparable products, which require you to wade deep into complicated menus and dialog boxes to build a presentation, Super Show & Tell displays all editing tools on screen. Adding, formatting, timing, and sequencing presentation elements is simply a matter of selecting any type of media (including sound clips) from a drop-down menu and clicking the appropriate icon.

As you add multimedia elements to slides, the results display in a quarter-screen window. You can view individual slides or entire presentations by clicking the Play icon in the VCR-like control panel beneath the viewing window. You can also switch from the slide-editing view to a full-screen display at any time by simply double-clicking the thumbnail image.

Like conventional presentation programs such as Microsoft PowerPoint and Harvard Graphics, Super Show & Tell can print audience handouts; however, it does not support outlining and speaker notes. The program does let you print a playlist of slides and their contents that you can use as crib notes to help you narrate your presentation. However, since most of the presentations you create with Super Show & Tell are self running or viewer interactive, speaker notes are not critical.

Super Show & Tell's Create Presentation Disk feature lets you distribute presentations on disk for viewing on another Windows PC. You can even copy a group of Windows setup files that install the presentation and an icon, to make running a remote presentation almost foolproof. But the graphics, animation, and video files are quite large, severely limiting the size of presentations that you can squeeze onto one floppy. Super Show & Tell does have a compression feature that almost doubles available disk space, but even 2.8MB (which is twice the capacity of a high-density 3½-inch floppy) is not a lot of room in the multimedia world. You'll need removable media, such as a SyQuest or Bernoulli drive, to transport presentations containing several animation and video files.

With Super Show & Tell, you should be up and running quickly, and finally getting your money's worth from your sound card and speakers.

—William Harrel

EVEN NOVICES CAN CREATE MULTIMEDIA PRESENTATIONS: Super Show & Tell 1.1 can combine graphics, sound, animation, and video.

CAD for the Rest of Us

TurboCAD 2.0 for Windows

Low-cost package's icons and context-sensitive tools ease CAD learning curve.
IMSI
800/833-8082
415/454-8901 (fax)
List price: $149.95, upgrade $29.95
Reader service no. 674

Low-cost design packages for the home and office have introduced computer-aided design to the masses. But if your needs go beyond building a new deck or putting up some office dividers, these limited programs will fall short. TurboCAD 2.0 for Windows is an affordable CAD application that focuses on ease of use without sacrificing the power and flexibility of a full-function design package.

The $149.95 TurboCAD is built around an icon-driven interface reminiscent of mainstream draw programs such as CorelDraw. While the context-sensitive icons and familiar mouse conventions may invite users to jump right in, TurboCAD is not as easy as it looks. Novice CAD users must become familiar with a variety of new concepts and processes before they can get much done. TurboCAD's interface has a few rough edges, with hosts of obscurely named icons and some baffling dialog boxes. Fortunately, the manual offers a step-by-step tutorial that gets you versed in TurboCAD's nuances. And the program delivers a lot of features. For a street price under $100, it includes context-sensitive tool bars and the ability to import and export AutoCAD DXF files. Like most CAD programs, it runs faster with a math coprocessor.

—Michael Desmond

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MultiSync 2V

NEC

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Circle 201 on reader service card

ImagePals 2: A Better Image Organizer

Surprise: Next week's presentation is now this week's. The image you need *might* be in that stack of floppies—if it's not on your hard drive. To cope with this mess, ImagePals 2's integrated bundle of image processing utilities make it easier to find what you need quickly.

The Album utility lets you build 160 file groups, each of which can hold more than 65,000 thumbnail images for easy search and retrieval. You can give each item a description, subject, format, client, date—whatever information works best for you. You can even make thumbnails of video, sound, and other Windows files and link them via OLE to other documents and images. Digging through Photo CDs? The new Browser function builds albums quickly for fast searches.

If you alter or move an original file, the thumbnail updates its own appearance automatically and remembers the file's new location. If it's not on the hard disk, ImagePals tells you which CD ROM or floppy it's on.

ImagePals' image editing utility also has a few enhancements. To reduce editing time, you can now preview special effects before applying them. And when you fine-tune an image, you can activate the Global Viewer to see the entire picture—handy for moving to the right spot without getting lost. Also new is the Clone tool, which can copy elements from separate images.

ImagePals' screen capture utility still doesn't do DOS, but it's a champ with Windows. You can crop, resize, and change image resolution, as well as add key lines, drop shadows, and borders to Windows images. And if you have images in the wrong file type, you can convert them separately or in batches to more than 40 file formats.

—John Goddard

MANAGE YOUR STOCKPILE OF IMAGES with Image Pals 2's Album utility. Each file group can hold over 65,000 thumbnail images.

ImagePals 2

Handy utility for organizing, editing, and capturing images.
Ulead Systems, Inc.
800/858-5323,
310/523-9393
List price: $129, upgrade $49
Reader service no. 675

Executor/DOS Runs Macintosh Software on PCs

Emulation software that enables Macintoshes to run DOS and Windows programs is nothing new. But now PC users can share files with Macs—and run some Mac software—using a new program called Executor/DOS. Although its emulation technology is still evolving, Executor is a useful tool for users who work in a mixed PC-and-Mac environment. I tested version 1.2, but version 2.0 should be available this summer.

One of Executor's most powerful features as a file transfer package is its ability to access Macintosh hard drives from a PC equipped with a SCSI interface. Executor also can access DOS hard disks (as Mac volumes) and DOS and Mac floppies. Another strong point: The program can run Mac-based file compression programs such as Compact Pro. A simple Mac desk accessory, HFS_Xfer, performs most common file management functions, including copying files and disks.

To use Executor, you need a 386 or better machine with VGA graphics, 4MB of RAM, and a mouse. Executor emulates an operating system similar to the Mac's System 6. According to Abacus Research, Executor has been tested with a handful of common Mac applications including Microsoft Word and Microsoft Excel. Other applications should run, too, provided they do not rely on any of the undocumented Macintosh operating system features—of which there are several. Sound is limited to beeps, however, and Executor doesn't let you print from Mac applications.

After Executor starts up, you simply double-click the Mac program you want to run. When you quit the Mac application, the system reverts back to DOS or Windows. The user interface is generally very snappy, and the emulated Mac performance on a 66-MHz 486DX2-66 appears to fall somewhere between that of a Macintosh Classic and a Mac LC.

According to the vendor, Executor/DOS 2.0 will address many of the shortcomings of the current version. Version 2.0 is expected to include color, sound, and printer support, in addition to improvements to compatibility and speed.

—Jeff Noxon

Executor/DOS 1.2

PC users can share files with Macs and run some Macintosh software.
Abacus Research & Development, Inc.
505/766-9115,
505/247-1899 (fax)
List price: version 1.2 $99, version 2.0 $249, 2.0 upgrade $59
Reader service no. 676

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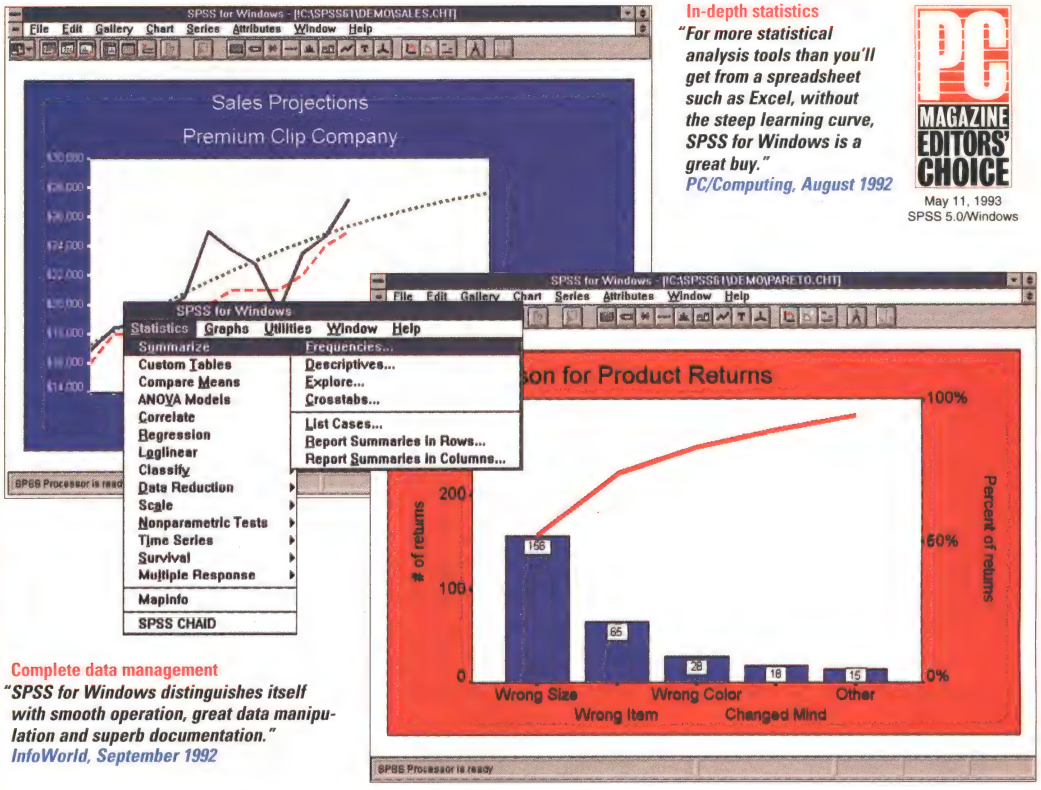

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Avantos's Review Writer: Bossware in a Box

Employee performance reviews—one of those necessary evils of a manager's life—can be far less painful with Review Writer, a new Windows-based package from Avantos. It helps you set, record, and track employee performance goals so you don't have to rifle through drawers or E-mail files, or rack your brain when it's time for that annual chat with George the Slacker. All you have to do is follow Review Writer's step-by-step instructions, make sure the shoe fits, and voilà: George's appraisal is ready to show to your boss, to the human resources department, and to George himself.

Review Writer novices will appreciate the Quick Build mode, a learn-as-you-go function that walks you through each step in the performance review process. It's easy to build a review document by selecting from lists of goals, skills, and behaviors; meanwhile, you can build records in a database, pulling examples and notes into your document at the click of a button.

Review Writer's built-in idea generator is tailor-made for managers who hate to struggle with the delicacies of phrasing. The Skill Rater feature, for example, gives you a selection of statements (such as "quickly understands the meaning of written materials"), then lets you choose one of five responses corresponding to each statement, ranging from "Strongly agree" to "Strongly disagree." The selection you choose automatically conjures up a correlating paragraph (such as "In general, Susan shows quick comprehension of the meaning of written materials") that you can copy and paste into your final review document.

Lest this seem too cookie-cutter an approach, Review Writer offers more than 120 phrases for each group of canned selections. You can also edit the final document. An originality checker combs your review word by word, making sure that you haven't said identical things about John and Amy. The product also scans for vague, illegal, or inappropriate language—such as references to sex, race, and religion—that could be construed as grounds for a wrongful-termination lawsuit. Finally, you can format and print your document from within the program, or you can save it as a text file and export it to your favorite word processor.

Unfortunately, Review Writer lacks built-in tables or charting capabilities, which might come in handy. And the lack of integration with packages such as popular word processors and spreadsheets limits Review Writer's flexibility. Still, any manager who hates those annual confrontations with George will feel relieved to have this $129 human-resources-counselor-in-a-box.

—Bronwyn Fryer

Avantos Review Writer

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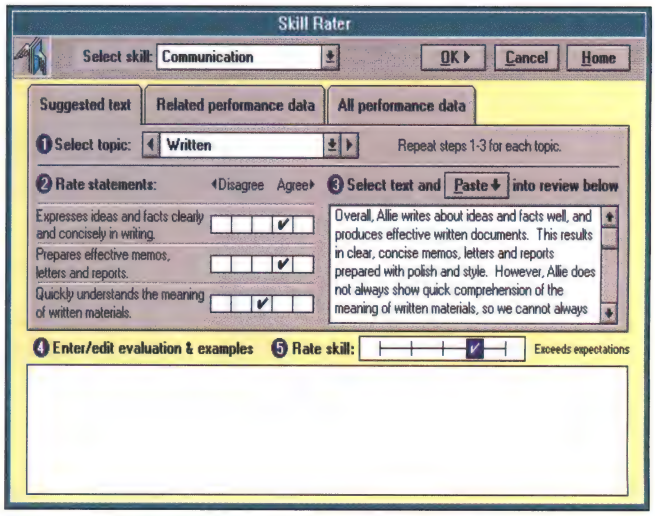

EMPLOYEE PERFORMANCE REVIEWS go easier with Avantos's built-in Skill Rater, which suggests text you can paste into a review document.

WordPerfect Does the Works

Novice, home, small-office, and mobile PC users have yet another choice in integrated software. In an effort to grab a piece of the Works pie currently held by packages from Microsoft, Claris, and PushButton, WordPerfect has introduced a new Windows version of its integrated software, WordPerfect Works 2.0, for the competitive price of $109. In addition to five applets—word processing, spreadsheet, database, draw, and paint—WordPerfect throws in Quicken 3.0 for Windows, a personal finance package that sells separately for $70.

Works' tool palette and button bars give you one-click access to most features. As with competitor ClarisWorks, you can access all WordPerfect Works applets from within one another. For example, to add a table to a report, you simply select the spreadsheet button from the tool palette; a miniature spreadsheet appears, the button bar options change, and you can access all the features in the spreadsheet module.

While Works is easy to use, it also has many advanced features, such as the ability to create 16 text columns and to wrap text around objects. The program includes six chart types and lets you build style sheets for your spreadsheets. And with the draw module, you can create multisided polygons. Unfortunately, Works' communications module simply dumps you into Windows' bare-bones Terminal program.

—Anita Hamilton

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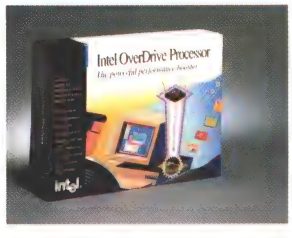

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Get Your Financial House in Order

It won't make money grow on trees, but Jonathan Pond's Personal Financial Planner may help you save to buy a yard where you can plant the tree.

Available with or without multimedia enhancements (basically just video clips of Pond, the popular author of financial books), this program focuses on the fundamentals of getting your personal finances in order.

Using the same ActiveBook technology found in the Wall Street Journal's Video Guide to Money and Markets (available in the CD ROM version of Quicken), Jonathan Pond's Personal Financial Planner leads you step-by-step through the process of creating a custom financial profile. The program then guides you through interactive "chapters" of the electronic book that correlate to specific financial objectives.

My least favorite of these was the retirement planner, which disclosed the alarming fact that, if I want to retire at age 50 with a $2500 monthly income, adjusted for inflation, I will have to start saving $2500 a month now, at age 32, and be sure not to live past 85.

Other sections address the need to establish or reestablish a good credit history, buying a house, reducing debt, developing a safe investment strategy, putting a child through college, buying insurance, and handling taxes. When you're done, you complete a plan for action.

But don't expect it to be easy. Your overall objective is to achieve financial security—especially upon retirement. You will be surprised at the work involved.

Vertigo Development Group has taken care to make sure the program truly serves your particular needs. Many personal finance products assume a certain audience—and it usually hasn't included me.

If the software is solid and the presentation is engaging—as is the case with this product—should we then take the advice it gives on the critical matter of our economic well-being?

I *have* a personal financial planner. Her name is Melissa and she works for a big company that handles the Fidelity funds. I trust her, and I'm a lot more likely to spend money based on her advice than on what a piece of software tells me. But even after several sessions with Melissa, during which she prepared a custom profile of my economic situation and explained my options, I gained greater generic knowledge from this package. And you also get Jonathan Pond: "You know you've achieved a stable pattern of spending when you spend the same amount of money in the three days after a windfall as you spent in the three days prior to the windfall." Ain't it the truth.

This ability to convey useful knowledge about finance—a difficult subject for many of us—has real value. For that reason, I recommend Pond's Personal Financial Planner, so long as you treat it with the same caution you would anyone who tells you what to do with your money. If you also want to gain a good working knowledge of the marketplace, I recommend the Wall Street Journal's Video Guide to Money and Markets.

—Joe Abernathy

Jonathan Pond's Personal Financial Planner

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Vertigo Development Group
800/942-2848
List price: CD ROM version $49, floppy disk version $39
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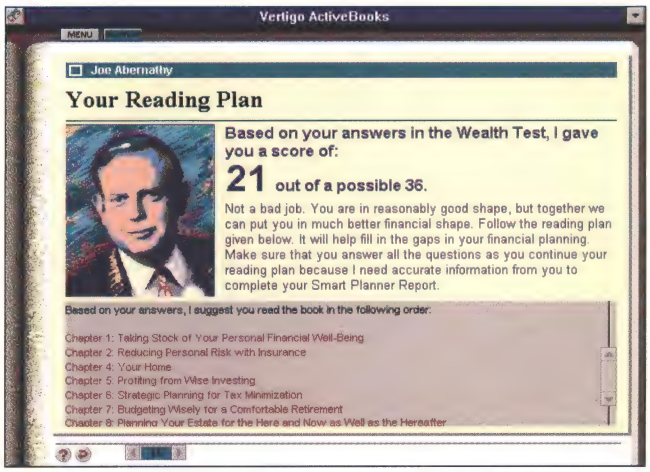

CREATE A CUSTOM FINANCE PROFILE to help plan your financial objectives in Jonathan Pond's Personal Financial Planner.

Instant Access to a Wealth of Info

Microsoft Bookshelf '94 is easier to use, more up-to-date, and nicer to look at than last year's edition. The popular multimedia reference library has an improved dictionary, book of quotations, thesaurus, and chronology of world events; in addition, the encyclopedia, world atlas, and almanac have been updated. Also new—and a real ace in the hole for anyone who writes—is the QuickShelf feature, which puts volumes of data at your fingertips. When you're creating a document in a Windows word processor and you need to flesh out an idea, highlight the word you're stuck on and click the QuickShelf tool bar. From there, you can access any work in the library for more information about the highlighted word. And since all seven volumes are linked, you can search all of them for citations—many of which have accompanying photos, sound, or video clips.

One of my favorite volumes is the encyclopedia, which has animated demonstrations on a wide range of subjects, from coal formation to nuclear fission. This CD ROM isn't just for kids or students; it's a thorough reference work and a great way to experience information. For all that, Microsoft Bookshelf '94 requires just 2MB of disk space.

—Caroline Jones

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LANtastic 6.0 Gives Server-Based LANs a Run for Less Money

Peer-to-peer LANs, which let you network PCs without having to dedicate one system as a server, have found a home in small offices and work groups. But in corporate environments, peer-to-peer LANs have been the Rodney Dangerfield of connectivity, not getting much respect from system administrators running complex and expensive client-server–based LANs. LANtastic 6.0 could change all that. The latest incarnation of Artisoft's flagship package still has all the capabilities of a peer-to-peer LAN, plus features and performance that eliminate many weaknesses (such as lack of security and few management tools) cited by peer-to-peer naysayers. LANtastic 6.0 is the only peer-to-peer network you can easily and inexpensively incorporate into most client-server networks. LANtastic workstations can act as clients to server-based LANs including Novell NetWare 2.*x*, 3.*x*, and 4.*x*; Windows NT Advanced Server; and Windows for Workgroups 3.11.

As a stand-alone network, LANtastic shines. Version 6.0 incorporates a new, tunable burst mode and an integrated SHARE facility that increase performance dramatically over previous versions of the product. Your mileage may vary depending on the programs you run and on overall network traffic, but I found it particularly fleet for networked database applications. And to further maximize performance and available RAM, LANtastic's server components are modular: You choose only the features you need.

You don't need Windows to run LANtastic 6.0, but it helps if you take advantage of LANtastic's most impressive feature, Artisoft Exchange. This full-fledged Windows groupware application expands the limited messaging facilities of earlier LANtastic versions. It includes powerful mail, scheduling, and fax facilities and support for numeric and text pagers.

New security features and integrated management should soothe nervous system administrators. You can choose multiple levels of security, from none all the way down to individual files. And you can monitor server configuration, status, and performance from any workstation—even receiving automatic warnings when disk space gets low or the network nears processing capacity.

LANtastic's versatility is unique: You can use it out of the box for simple LANs, or fine-tune it for more complex installations. Artisoft has upped the prices slightly from those prior versions and has eliminated the unlimited-use license. But with prices starting at $119 per PC (software only), LANtastic 6.0 has nearly all the features and performance of a server-based LAN, at a fraction of the cost.

–Stan Miastkowski

LANtastic 6.0

Artisoft's LAN has improved peer-to-peer groupware and client-server features.
Artisoft, Inc.
800/233-5564,
602/670-7100,
602/670-7101 (fax)
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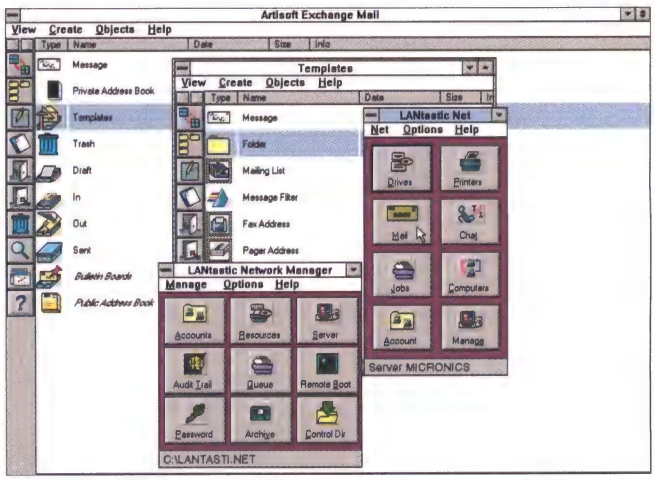

POWERFUL PEER-TO-PEER: LANtastic 6.0 offers sophisticated E-mail and scheduling, as well as comprehensive network management.

Plug and Play Networking Now

Socket Communications and New Media and are touting new PCMCIA LAN adapters with Plug and Play capabilities that make them literally a snap to install and uninstall. These cards give you Chicago-like Plug and Play now.

Software is the key. Normally, if you remove an adapter in midsession, the network software has a nervous breakdown. But the drivers for Socket's and New Media's Ethernet LAN adapters can suspend network activities without crashing your system. When you plug either card back in, the drivers tell the network OS you're back, and life goes on.

Both cards are also standard PCMCIA LAN adapters that comply with the PCMCIA 2.1 specification, and both accept 10BaseT and 10Base2 wiring; New Media also sells separate 10BaseT and 10Base2 models.

Each New Media card ships with Novell NetWare ODI and Microsoft NDIS LAN drivers, plus a copy of SystemSoft's software for managing the PCMCIA card and socket. Socket's EA+ adapter also ships with the ODI and NDIS drivers; while it works with the SystemSoft software, you'll have to download the software from Socket's BBS.

–Dan Miller

New Media Ethernet LAN adapter

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A Near (Word)Perfect Way to Share Documents

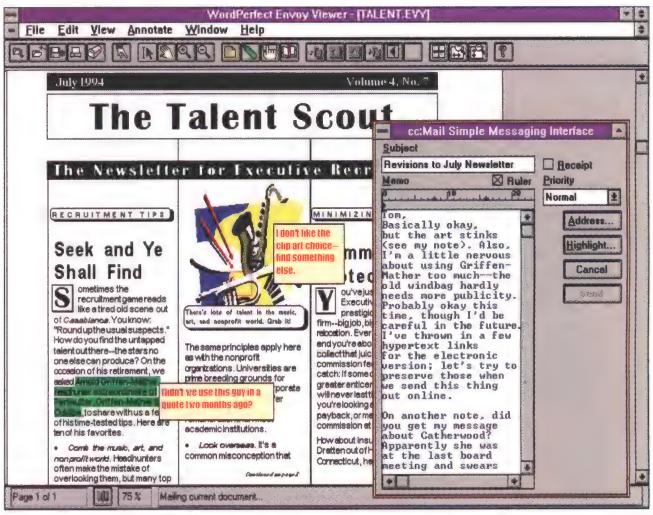
First came Adobe Systems, preaching the gospel of the portable document—a special file format that you can exchange, distribute, and view across multiple computer platforms. Now WordPerfect, ready to reap the rewards of Adobe's groundwork, is introducing Envoy, a portable-document solution that's faster, more compact, less expensive, and more flexible than Adobe's Acrobat.

Envoy is essentially a printer driver. Windows or Macintosh users working on a document choose the Envoy driver from a print menu, or drag a file into the Envoy viewer, to create a proprietary EVY file. Then any recipient of the file who has an Envoy viewer (which can be bound—for free—into the original file) can zoom, print, search, and highlight text; add sticky notes, bookmarks, and OLE objects; and even apply hypertext links. The embedded viewer adds about 400K to the file size.

Though Mac and Windows users who own a copy of Envoy can share the same EVY file, recipients without Envoy who read files with the embedded viewer can only open them on the platform in which they were created. WordPerfect is considering offering a free miniviewer that would work with both Windows and the Mac, but the company had not made a final decision as we went to press.

You can display thumbnail views of a document alongside a full-page view, navigating among pages by clicking the appropriate thumbnail. Even in a prerelease version, Envoy is remarkably quick; it creates files in seconds and does multiple-page text searches almost instantaneously. We found negatives, however: Though Envoy preserves line and page breaks, it does only a fair job of matching the original fonts, and you can't export Envoy files into any third-party formats.

—Steve Fox



ADD HIGHLIGHTS, NOTES, AND ANNOTATIONS to a document, then E-mail it back to its creator from within the Envoy viewer.

WordPerfect Envoy

Portable documents Windows and Mac users can view.
WordPerfect Corp.
800/321-4566
List price: $189
Reader service no. 644

Hey, My Keyboard Is Ringing!

Remember the "Get Smart" TV series, where secret agent Maxwell Smart had a telephone hidden in his shoe? Integrated Technology's CompuPhone might not be quite as outrageous, but it's still intriguing: It's a telephone housed inside a keyboard.

When you first take the CompuPhone out of the box, you'll see a standard 101-key Key Tronic keyboard; the telephone's electronics are inside. Located on the back of the keyboard are two connectors—one for the phone line, and another for a handset or headset.

The CompuPhone's ringer alerts you to incoming calls. To make an outgoing call, you hit the <Dial> button above the keypad, then use the keypad to dial the number. While I generally found the CompuPhone easy to use, dialing was a bit tricky at first because the keypad's digit keys are in the opposite order of a telephone's, with the 7-8-9 keys on top and the 1-2-3 keys on the bottom. According to the company, a toggle switch lets you reverse the keys. (You'll have to pay an extra $12 for reverse key caps.)

The product includes the CompuPhone Dialer, a Windows and DOS utility that lets you dial phone numbers from within your applications. For instance, Windows users can copy a phone number from a WinWord document to the Clipboard, hit a hot key, and the CompuPhone will automatically dial the number. The software can also dial numbers listed in Windows' Cardfile. However, I couldn't get the Dialer to work with Lotus Organizer. An Integrated Technology spokesperson says the company is talking with developers of contact manager software about adding support for the CompuPhone.

I was impressed with the simple yet effective CompuPhone Dialer for Windows. However, its installation program needs work: Unlike most Windows programs, the Dialer stops short of creating its own Windows icon—you have to do this yourself by delving into Program Manager commands.

While the CompuPhone is handy for salespeople, telemarketers, people with limited desk space, or any PC users who spend a lot of time on the phone, its $159 list price is a bit steep. The product works best with a phone headset, which typically costs an extra $50.

—Jeff Bertolucci

CompuPhone

This keyboard with an integrated telephone saves time and desk space.
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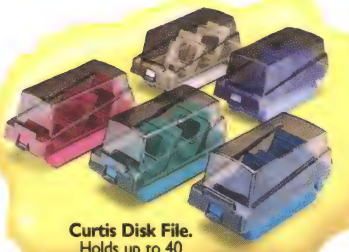

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Don't let a drab work area drag you down. Put a little color in your life with new Curtis Colors.

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For more Information, Call Curtis at 1-800-955-5544 Ext. 240

PocketPro Portable Presentation System

If you carry a portable computer for presentations and need to lighten your hardware load, try the PocketPro. This portable presenter measures 5 by 6 by 1.75 inches and weighs about 1 pound. You connect it to your notebook's VGA port and place it on a Kodak Carousel or Ektographic slide projector. A 640-by-480-pixel, gray-scale, active-matrix LCD screen fits into the projector's slide opening, letting you project images from your computer screen via the projector's optical system. Priced at about $1500, the PocketPro also includes a remote control. Kopin Corp., 800/983-6060.

Reader service no. 655

Statgraphics Plus for Windows

Sifting through reams of statistical data is not your cup of tea? Manugistics's new Statgraphics Plus for Windows offers a graphical approach to examining the results of statistical analyses. The program aims to please novices with interactive graphs that let you examine data using different modeling methods. If you don't know a statistics term, you can check Statgraphics' glossary for a quick definition. The program's StatFolio feature saves information from a completed analysis—including raw data, graphs, tables, and any notes you take—making it easier to run the same analysis on new data. Statgraphics offers DDE links to other Windows programs, such as Microsoft Excel, Lotus 1-2-3, and Borland's Quattro Pro, so you can keep spreadsheets updated as you work. For more advanced users, the company offers add-on modules for such specialized applications as multivariate statistics. The program lists for $649; add-on modules are $399 each. Manugistics Inc., 800/592-0050, 301/984-5123.

Reader service no. 656

ReelMagic Lite

A new, less expensive version of Sigma Designs' ReelMagic video playback card, ReelMagic Lite will please multimedia fans who already have a sound card but now want full-motion video. With this card, you can play full-screen, full-motion video at 30 frames per second, rather than suffer through blurry Video for Windows clips. (However, your CD ROM titles have to support ReelMagic's MPEG compression scheme.) The ReelMagic Lite package includes a controller board, an MPEG version of Sigma's choice of an entertainment title on CD ROM, and an installation floppy disk. That's everything the company's original $449 ReelMagic product has—except an integrated sound card. ReelMagic Lite lists for $349. Sigma Designs, 800/845-8086, 510/770-0100.

Reader service no. 657

UMAX BizCard Reader

Bet you'd like to come back from your next meeting or trade show and scan in all the business cards you've accumulated, instead of typing the information into your PC. UMAX's new BizCard Reader is a small, 400-dots-per-inch scanner that weighs a mere 15 ounces and connects to a parallel port. You feed in business cards one at a time; a typical scan takes about 10 seconds.

The BizCard Reader features background processing, which means it can scan cards while your PC does something else, such as crunch through a spreadsheet. If you're short on time, the scanner's deferred processing option lets you scan cards now and have the product's OCR software process the information later. Other software features include automatic rotation—meaning that it doesn't matter which end of the card you feed in first—and direct links to three personal information managers: Symantec's Act, Polaris's PackRat, and Lotus Organizer. At press time, UMAX had no figures on the scanner's accuracy rate. The BizCard Reader is priced under $300. UMAX Technologies, 800/562-0311, 510/651-8883.

Reader service no. 658

PORTABLE PRESENTATION SYSTEM: Kopin's 1-pound PocketPro lets you use a slide projector to display your PC screen's output.

Journalist for Prodigy

Imagine walking into your office each morning and finding a customized newspaper that covers the subjects most important to you. If you're a Prodigy subscriber, you can get just that with Ped Software's Journalist for Prodigy. (An earlier version of Journalist is for CompuServe users.) You specify a daily time for Journalist to log on to Prodigy and gather articles that interest you. For example, you can choose headline news, stock quotes, sports, entertainment, and local weather. You can also choose one of several layouts for your personal newspaper. According to Ped Software, Journalist users will likely save on connect charges, because they spend less time poking around online for interesting articles. The program also displays both color and black-and-white photographs. Prodigy users can order Journalist online for $49.95. Ped Software Corp., 800/548-2203, 408/253-0894.

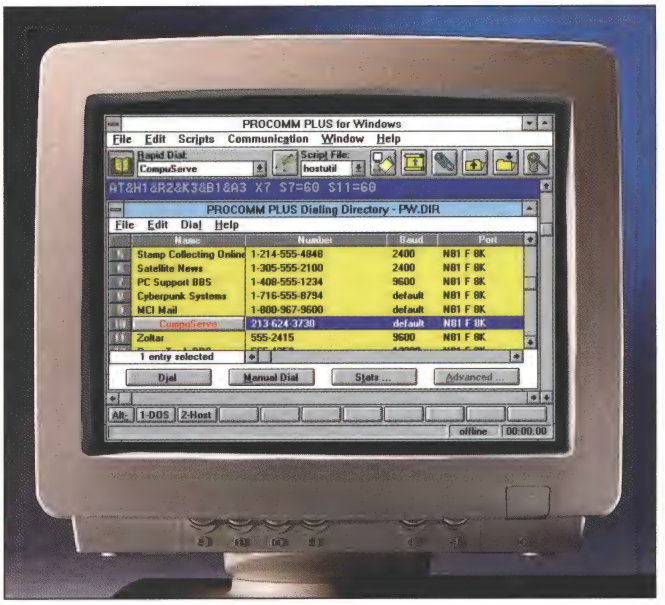
Reader service no. 659

FoxPro 2.6 for Windows

The latest upgrade of Microsoft's FoxPro relational database manager adds the FoxPro Catalog Manager, a graphical interface that displays all database functions on one screen, including tables, queries, screens,

New Delrina WinComm PRO makes powerful communications easy. So why struggle with Procomm?

Delrina WinComm PRO™



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To take part in the on-line revolution, you'll need a powerful communications package.

One that handles all major file transfer protocols, like Zmodem, Xmodem, Ymodem, Kermit and others. One that supports every popular terminal emulation. And has a powerful scripting language for automating on-line sessions.

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In that case the only choice is new Delrina WinComm PRO™. The one *PC Computing* called "...Intuitive enough for a novice user, yet still packed with enough sophisticated features to keep an on-line junkie happy."

	Delrina WinComm PRO	Procomm Plus™ for Windows*
Pre-defined scripts for on-line services	MCI Mail, CompuServe, GEnie, AT&T Mail, BIX, Delphi, Dow Jones & NewsNet	MCI Mail & CompuServe
Drag-and-drop file sending	Yes	No
Built-in script recorder	Yes	Yes
Phonebook	Customizable	Fixed
Split-screen session window	Yes	No
Scrollback buffer	200 pages	31 pages
Supports all popular file transfer protocols and terminal emulations	Yes	Yes
Virus detection during download	Yes	No
Shares a COM port with WinFax PRO	Yes	No
Integrated off-line text editor	Yes	No

Buy Delrina WinComm PRO alone, or as part of the money-saving Delrina Communications Suite™ which also includes Delrina WinFax PRO™, far and away the best-selling fax software in the world. Either way, you'll have the power you need and the ease of use you've only dreamed of.

Call for information or to upgrade from any Procomm product for just $49. Or see your local dealer to upgrade immediately.

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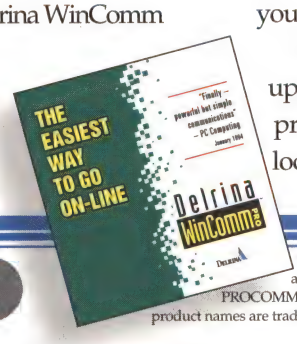

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Circle 171 on reader service card

labels, reports, and programs. The Catalog Manager also describes file contents and shows relationships among database elements. A new AutoMigrate facility simplifies migration from dBASE III or IV, as well as automatically creating equivalent FoxPro files for tables, screens, reports, labels, and queries while leaving the original files intact. Ten new wizards also simplify FoxPro activities. FoxPro 2.6 for Windows lists for $495; version 2.5 users can upgrade for $19.95. The Professional edition for developers lists for $695. Microsoft Corp., 800/434-3918.

Reader service no. 660

Logitech MovieMan

Logitech likes to say that its mice, scanners, and other products bring human senses, such as touch and sight, to computers. MovieMan, the company's new video capture board, is a logical addition to the Logitech product line. MovieMan lets your computer hear as well as see: It can simultaneously record and play 16-bit stereo sound and 30-fps video. (Most video capture boards require you to use a separate sound card, which can lead to audio/video synchronization problems.) MovieMan's on-board compression squeezes video files by ratios between 4 to 1 and 6 to 1, and Logitech claims that users will be able to upgrade to more powerful compression schemes in the future. The board is bundled with Adobe's Premiere video editing software and supports Microsoft Video for Windows and WAV audio files, so you can also use it to play multimedia CD ROM titles. MovieMan lists for $299. Logitech, 800/231-7717.

Reader service no. 661

Image-In Professional Pack 3.2

Whether you're scanning, editing, or printing an image, what you see on screen is not always what you see in print. To help out, Image-In Professional Pack 3.2 bundles several easy-to-use utilities (including Agfa's Foto-Tune LE) to calibrate your scanner, monitor, and printer for accurate results. The ScanAssist module works much like an automatic camera: Before you make a scan, it calculates the scan resolution and file size. If you need to fix a bad scan, Image-In's editing tools include more than 140 manipulation filters. Like a photographer, Image-In's PhotoLens filter adjusts the exposure and maintains the overall brightness of an image. The SpectraColor filter can alter sets of similar colors in an image, so that an overcast sky becomes a warm afternoon, or a pale executive suddenly looks well again (just choose the Healthy filter effect). Image-In lists for $795. CPI, Inc., 415/961-6556.

Reader service no. 662

Microsoft Electronic Forms Designer

If you need to develop forms to use with Microsoft Mail for Windows, check out the company's new Electronic Forms Designer. You use Visual Basic to create forms that users can fill out and shuttle around the network. A generic template and two predesigned, customizable forms (a routing slip and a telephone message form) get you started quickly. Electronic Forms Designer forms can retrieve and incorporate information from Microsoft SQL Server, FoxPro, and Access databases using Microsoft's ODBC specification; it also retrieves information from text, charts, graphs, and other objects via OLE. Microsoft Electronic Forms Designer lists for $395. Microsoft Corp., 800/426-9400.

Reader service no. 663

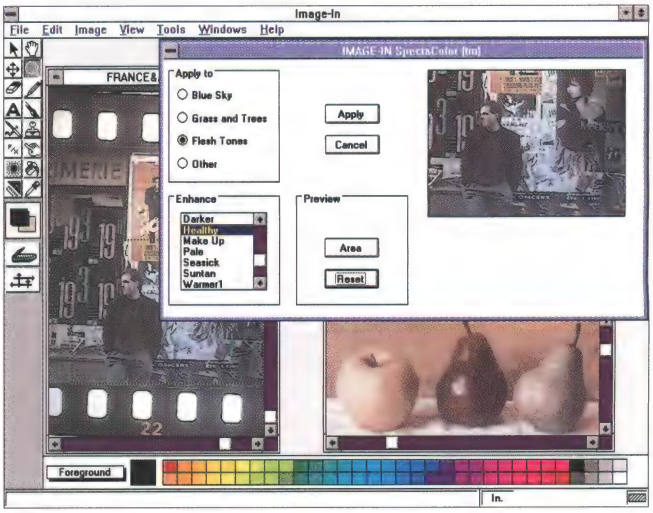

IMAGE-IN PROFESSIONAL PACK 3.2 includes over 140 manipulation filters. The SpectraColor filter can alter sets of colors in an image.

Diamond Viper Pro, SpeedStar 64

Diamond Computer Systems' newest graphics accelerator cards include a model for users of PCI and VESA local bus systems, and one for ISA-bus users in search of local bus–like performance. The Viper Pro, available in PCI and VL bus versions, is a VRAM-based accelerator that offers 24-bit color at 1280 by 1024 resolution; it's designed for users who want faster performance in programs such as Windows 3.1 and AutoCAD. For ISA-based systems, the SpeedStar 64 is a 64-bit graphics card that, Diamond claims, provides Windows performance comparable to that of VL bus systems. When equipped with a full 2MB of DRAM, the card displays up to 16.8 million colors at 800 by 600 resolution, or 256 colors at 1280 by 1024. The Viper Pro lists for $479 with 2MB of VRAM; the 4MB version is $699. The SpeedStar 64 is $195 with 1MB of DRAM, and $235 with 2MB. Diamond Computer Systems, 800/380-0030, 408/736-2000.

Reader service no. 664

Wyse Forté GSV Systems

Wyse's new family of Forté GSV systems range from a 33-MHz 486SX to a 60-MHz Pentium. According to Wyse, all that's necessary for a fast performance upgrade in a Forté GSV is a processor change. Each Forté motherboard contains two ZIF sockets for CPUs: one for a 32-bit 486, and the other for a 64-bit Pentium. Housed in a slim-line desktop chassis, each system offers a wide range of features, such as built-in ethernet and high-speed serial ports that support data communications at speeds of up to 115.2 kbps. Street prices range from $1325 to $5695. Wyse Technology, 800/438-9973.

Reader service no. 665

For more information about any product, contact the manufacturer or circle the number on the reader service card.

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Also see the JX-9400 low cost 300 dpi laser printer.

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Give your power-hungry soft

The OverDrive™ processor. The single-chip upgrade that maximizes your PC's performance.

Want to see a spectacular performance? Then add an Intel486™ DX2 OverDrive processor to your Intel486 SX or DX CPU-based system. And watch *all* your power-hungry software take off.

The OverDrive processor improves the performance of all your applications. So you can fly through your overwhelming workload with the greatest of ease.

How does the OverDrive processor do it? Using Intel's innovative DX2 "speed doubling" technology, it runs internally at twice the speed of the rest of your system. So if you had a 33 MHz SX or DX Intel processor, you would now have a 66 MHz DX2 Intel processor.

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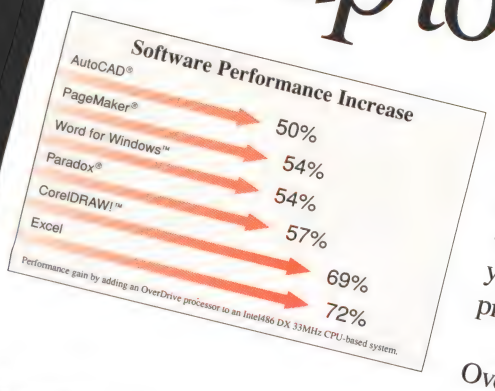
ware up to 70% more ka-boom.



Plus, the OverDrive processor is easy to install. Depending on your system, you can either plug it into the OverDrive socket or swap it with your original microprocessor. No problem.

To get a better idea of how the OverDrive processor boosts performance of your software, call 1-800-354-3112, Ext. 5730,* for a free demo disk. It could be the greatest show on earth.

Circle 109 on reader service card

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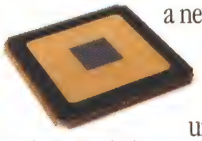
This isn't just a new family of Macintosh® personal computers. It's a whole new kind of personal computer.

A new architecture. A new chip. A new standard that exceeds previous personal computing standards – yet works with DOS, Windows and Macintosh.

Introducing Power Macintosh.™ It's more powerful than a Pentium processor-based PC. It's more human than a Macintosh. It's the most powerful line of personal computers in the world.

The power of Apple, IBM and Motorola.

At the heart of Power Macintosh is the PowerPC™ 601 microprocessor: the first of a new family of ultra-high-performance RISC chips developed in a unique three-year collaboration between Apple, IBM and Motorola.



The PowerPC 601 has a lot of power inside it: the combined resources of IBM, Motorola and Apple.

The RISC technology of Power Macintosh brings a whole new level of performance to personal computing. Software written to take advantage of its unique new capabilities, in fact, will run significantly faster than the same programs written for 486 or Pentium processor-based PCs.

Combine the power of RISC with the practical simplicity of a Macintosh personal computer, and the result is more work done in less time, with lower support costs.

The power to run MS-DOS, Windows and Macintosh software.

Many Power Macintosh configurations come bundled with SoftWindows™ from Insignia Solutions, an innovation that lets Power Macintosh run hundreds of off-the-shelf MS-DOS and Windows applications at 386 and 486 performance levels. (Of course, Power Macintosh runs thousands of Macintosh productivity programs, too.)

This is just the most recent example of Apple's commitment to making it easier for MS-DOS and Windows users to take advantage of Macintosh innovations.

The power of RISC for as little as $1,819.*

These days, the whole personal computer industry is buzzing about the potential of RISC processor technology in PCs.

"My next computer will be a PowerPC. I was using Intel-based machines long before the PC was a glimmer in IBM's eye, but as Emerson said, foolishly held consistency is the hobgoblin of little minds.... It's time for a change, and the time is now," wrote Bill Machrone in *PC Week*. "That next machine will probably wear an Apple logo.... Apple appears to be a good six months ahead of IBM in terms of [PowerPC] product development and software integration."

Power Macintosh	6100/60	7100/66	8100/80
Processor	PowerPC 601	PowerPC 601	PowerPC 601
Speed	60 MHz	66 MHz	80 MHz
Memory	8MB to 72MB	8MB to 136MB	8MB to 264MB
Expansion slots	1 PDS or NuBus	3 NuBus	3 NuBus
Hard disk storage	160MB or 250MB	250MB or 500MB	250MB to 1GB
Video support	DRAM	DRAM, VRAM 1MB to 2MB	DRAM, VRAM 2MB to 4MB
Networking	Ethernet	Ethernet	Ethernet
Apple Price	From $1,819	From $2,899	From $4,249

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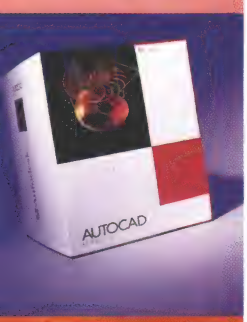
From left, the new Power Macintosh 8100/80, Power Macintosh 7100/66 and Power Macintosh 6100/60.

Introducing Power Macintosh.

Apple

Effective 3/14/94. Apple Price includes the Power Macintosh 6100/60 with 8MB of memory and a 160MB hard drive. For the sake of custom configuration, keyboard, monitor and mouse are sold separately. Unless bundled with a particular configuration, SoftWindows must be purchased separately. Retail prices may vary depending on location. *©1994 Apple Computer, Inc. All rights reserved. Apple, the Apple logo, Macintosh and "The power to be your best" are registered trademarks of Apple Computer, Inc. AppleScript, Macintosh PC Exchange, Power Macintosh, QuickTime and TrueType are trademarks of Apple Computer, Inc. PowerPC is a trademark of International Business Machines Corporation, used under license therefrom. Windows is a trademark of Microsoft Corporation, and SoftWindows is a trademark of Microsoft Corporation used under license.*



BEST PRODUCTS OF 1994

Your Ultimate Buying Guide: Experts Pick Hardware and Software Winners in 62 Categories • By Bronwyn Fryer

You're in the market for a new piece of software or hardware. You've read all the reviews and quizzed friends and co-workers, but you still can't find a consensus. Your sister-in-law, the computer whiz, swears Product A is the best, while your MIS rep insists Product B is the sine qua non. What do you do?

It would be great if there were an expert you could turn to every time you have to choose an important piece of hardware or software. And now there is.

To help you make an expertly informed decision—whether you're picking the new database for your department or a CD ROM title for your family—*PC World* polled 200 PC experts who are proficient with a wide range of business and leisure products and asked them to select the World Class products for 1994. We picked our expert panel using two principal criteria: familiarity with a wide variety of hardware and software and with the PC industry as a whole, and an ability to make unbiased judgments. The group we polled is as diverse as the winning products they selected: technical support and computer training professionals, industry analysts, user group presidents, consultants, value-added resellers, corporate and government computer buyers, writers, and editors.

In the pages that follow, you'll find a complete list of the World Class award winners and hear why our experts selected them. The final list represents a mix of old favorites, such as Artisoft's LANtastic peer-to-peer networking software, and exciting newcomers, like Arabesque's innovative personal information manager, Ecco Professional. Old or new, the winners share some important traits: innovative design, high performance, and solid value.

PCs

Printers

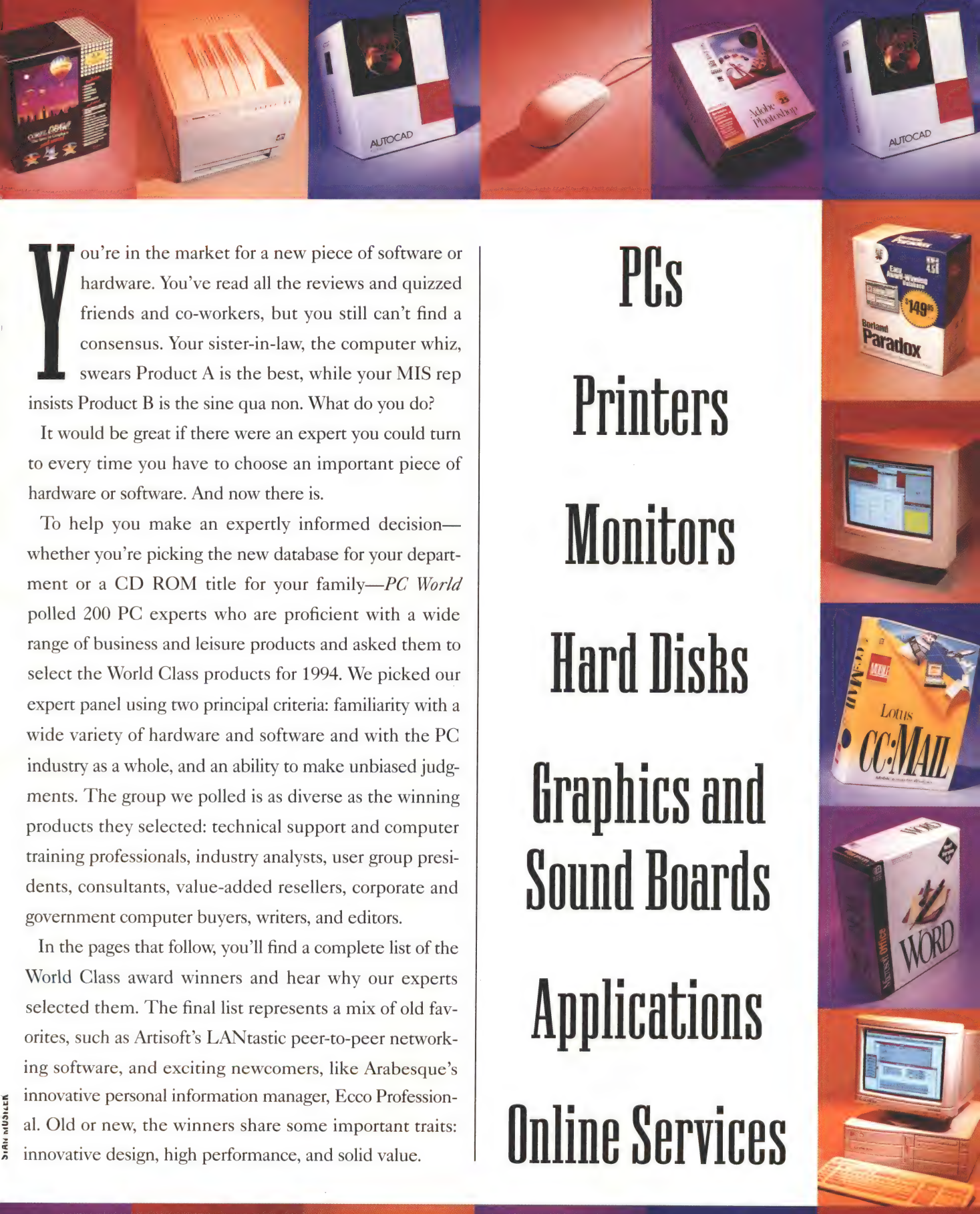
Monitors

Hard Disks

Graphics and Sound Boards

Applications

Online Services



The Best Hardware: Innovation Is Key

Our hardware winners span the spectrum from a fast, low-cost desktop computer to innovations in portable and wireless computing.

From the hundreds of notebook computers available in 1994, our experts chose the IBM ThinkPad 755C. "The ThinkPad has the kind of thoughtful engineering that you're surprised to find in a computer," says James Fallows, Washington editor of the *Atlantic Monthly.* Besides covering politics and economics for the nation's oldest magazine, Fallows has covered technology since 1980.

The Hewlett-Packard OmniBook 400, a tiny 4-pounder, won in the Subnotebook Computer category. Ripley Hotch, a columnist and former senior editor for *Nation's Business* (a respected business publication in Washington, D.C.), is an admirer of the OmniBook. Hotch, who has followed the high-tech industry since 1975, says, "It's awfully powerful for something that small."

Among PDAs, votes were tied between two $699 products—the much-ballyhooed Apple Newton MessagePad and the Hewlett-Packard HP100LX. The Newton, a pen-based notepad, offers a handy to-do list and appointment book, but needs an overhaul of its handwriting recognition. The HP100LX features a powerful processor and integrated mail software but is hampered by a tiny keyboard.

Not all new technologies demand compromise, though. Many panelists were effusive in their praise of the Megahertz XJack fax-modem card, one of the latest PCMCIA cards to hit the market. Jerry Schneider is president of Schneider Associates, a technology consulting firm that regularly surveys thousands of users. He spends a great deal of time traveling, and says, "As a road warrior, I'm completely dependent on my XJack."

▲ The Desktop

Desktop Computer
Gateway 2000 P4D-66

Monitor
NEC MultiSync 5FGe

Input Device
Microsoft Mouse 2.0

Lamborghini Quality at a VW Price

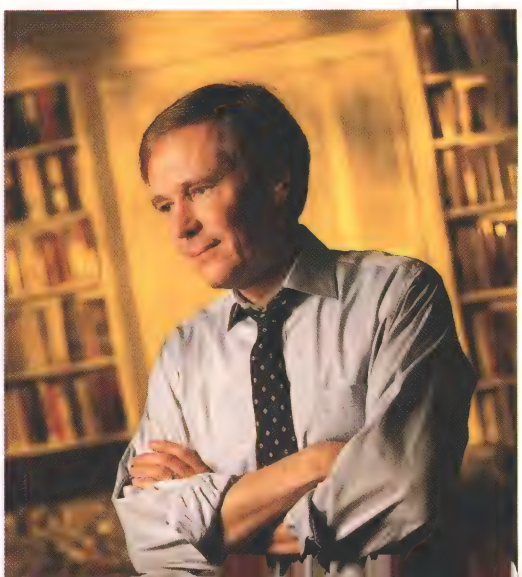
In general, our experts chose hardware products for their price and performance as well as the quality of the company's service. "Everyone wants a wireless, 2-pound, active-matrix, 500MB, super-reliable computer for under $1000. We all want a Lamborghini for the price of a VW bug," says Schneider.

Among desktop computers, the closest thing to this miraculous crossbreed is more like a used Volvo: solid and reliable, but not quite state-of-the-art. Experts voted overwhelmingly for the Gateway 2000 4DX2-66V. The product is currently being phased out, but its successor, the P4D-66—a similar system that began shipping in February—packs an Intel 486DX2 processor and 8MB of memory into a small box.

Software: Invasion of the Gates

On the software front, Microsoft led in 10 of the 34 categories, including Word Processor, Spreadsheet, Project Manager, Operating System/Environment, and Most Promising Newcomer. "As long as Microsoft makes good products, provides decent support, and doesn't charge twice as much as anyone else, users don't care that the company dominates," says Jeff Silverstein, publisher of the *Software Industry Bulletin,* a weekly newsletter.

But in the database arena, Microsoft Access ran into competition from Bor-



KATHERINE LAMBERT

"The ThinkPad has the kind of thoughtful engineering that you're surprised to find in a computer."

James Fallows *Atlantic Monthly*

The Big Three

Word Processor
Microsoft Word 6.0 for Windows

Spreadsheet
Microsoft Excel 5.0 for Windows

Database
Microsoft Access 1.1
Borland Paradox 4.5 for Windows

Application Suite
Microsoft Office 4.0

Mobile

Personal Digital Assistant
Apple Newton MessagePad
Hewlett-Packard HP100LX

Wireless Communications Device
Traveling Software LapLink Wireless with AirShare

PCMCIA
Megahertz XJack PCMCIA

Laptop/Notebook Computer
IBM ThinkPad 755C

Subnotebook Computer
Hewlett-Packard OmniBook 400

Multimedia

Sound Card
Creative Labs SoundBlaster/16 with Advanced Signal Processing

CD ROM Drive
NEC MultiSpin 3Xi

Multimedia Upgrade Kit
Creative Labs Discovery CD 16

CD ROM Titles
Business Application: Corel Systems CorelDraw 4.0
Children's Education: Broderbund Just Grandma and Me
Professional Education: Microsoft Encarta 1994
Game—Adult: Virgin Games 7th Guest
Game—Children: 7th Level TuneLand

land's Paradox for Windows. The experts were in agreement that the two similarly priced products are evenly matched.

And Microsoft lost out to competitors in several areas, including Presentation Graphics, Groupware, and LAN E-Mail. In the Groupware category, Lotus Notes was the winner, providing a combination of electronic bulletin board services, document management, and information storage that's without peer.

The lack of any real competition showed up in the experts' votes for industry standard and time-tested products. Novell's NetWare 3.12, Microsoft's Windows 3.1, Lotus's cc:Mail 2.0 for Windows, Corel's CorelDraw 4.0, and Datastorm's Procomm Plus 2.1 for Windows still command not only the majority of their markets but the largest share of votes from our experts.

Artisoft's LANtastic peer-to-peer network operating environment won the award for LAN Operating System (Peer to Peer), with our panel citing its straightforward installation and ease of use as two strengths. But many panelists believe this longtime leader is in for some competition from Windows for Workgroups 3.11—this peer-to-peer product from Microsoft was voted Most Promising Newcomer in the software category.

In categories that some users might consider niches—Optical Character Recognition, Image Editing/Paint, Personal Finance, Utility—the winners continue to be companies that have already stood up to the invasion of the Gates. One notable exception, though, was Arabesque's Ecco Professional, voted best Personal Information Manager. Experts agree that Ecco offers a flexibility unavailable in most other PIMs. "It's unusual for a product like this to stand out in such a crowded area," says Silverstein.

"You'd think that with a virtual monopoly on the PC desktop market . . . Intel wouldn't feel so insecure."

Amy Wohl *Wohl Associates*

◀ Drives

Hard Drive
Western Digital Caviar

Removable Portable Drive
Iomega Bernoulli Transportable MultiDisk 150

Tape Backup Drive
Colorado Memory Jumbo 250

Optical Drive
Pinnacle Micro Tahoe 130

▼ Operating System

Operating System/Environment
Microsoft Windows 3.1

LAN Operating System (Peer-to-Peer)
Artisoft LANtastic 5.0

LAN Operating System (High-End)
Novell NetWare 3.12

Once and Future Winners

As the foundation is laid for the information superhighway, experts predict that products in fast-growing areas like multimedia and wireless computing will become part of a growing number of home and office computing workstations. Dozens of new products will vie for our attention—and our pocketbooks.

Will this year's winners withstand the coming competition? Nothing's guaranteed in the race for our dollars...except change. Today's leaders will need to move fast to stay on top; there's a whole new breed of competitors just waiting to take their place.

Bronwyn Fryer is a contributing editor for PC World. PC World *research manager Thomas Gewecke, accounting professional Bill White, and Constat, a San Francisco–based market research firm, contributed to this article.*

▼ Desktop Publishing

Desktop Publisher
Aldus PageMaker 5.0 for Windows

Font Package
Microsoft TrueType 2.0

▲ Printers

Color Printer (High-End)
Tektronix Phaser 220i

Laser Printer (Black-and-White)
Hewlett-Packard LaserJet 4Si

Color Printer (Low-End)
Hewlett-Packard DeskJet 560C

Ink Jet Printer (Black-and-White)
Hewlett-Packard DeskJet 520

▼ For the Group

Groupware
Lotus Notes 4.0

Forms Software
WordPerfect InForms 1.0 for Windows

Most Promising Newcomer (Software)
Microsoft Windows for Workgroups 3.11

▲ Input

Optical Character Recognition
Calera WordScan Plus 2.0

Scanner
Hewlett-Packard ScanJet IIcx

▼ For the Brains of the Group

Programming Language
Microsoft Visual Basic 3.0

Computer-Aided Design
Autodesk AutoCAD

▲ Graphics

Graphics Accelerator Board
Diamond Viper

Presentation Graphics
Lotus Freelance 2.01 for Windows

Draw Software
Corel Systems CorelDraw 4.0

Image Editing/Paint
Adobe Photoshop 2.5

▼ Managing People, Time, and Projects

Project Manager
Microsoft Project 3.0

Personal Information Manager
Arabesque Ecco Professional 1.1

Contact Manager
Symantec Act 1.1

▼ Watching the Money

Accounting
Intuit QuickBooks 3.0 for Windows

Personal Finance
Intuit Quicken for Windows

Tax Planning/Preparation
ChipSoft TurboTax 11.0 for Windows

PowerPC vs. Pentium: One-Upmanchip

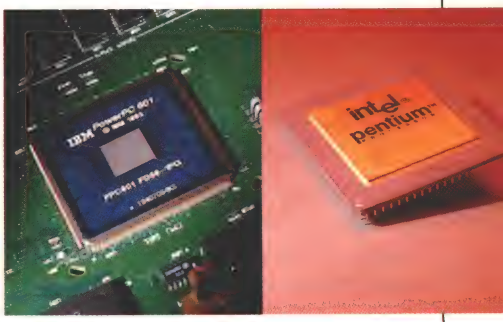
Quick, which is better: a microprocessor that lets users run Macintosh and Windows applications on the same computer, or one that can breeze through even the densest multimedia applications at lightning speed?

The PowerPC—the Apple-IBM-Motorola RISC processor with the potential to run a variety of operating systems—won Most Promising Newcomer (Hardware), while the Intel Pentium processor garnered the most votes for Product of the Year. Both products offer dazzling performance and promise.

According to analysts, the PowerPC offers both power and performance at a very low cost (currently, fully configured Apple PowerPC systems—called PowerMacs—cost just $2000 on the street). For the huge number of companies running multiple systems, as well as for "ambidextrous" computer users who work on both Macs and PCs, the PowerMac is a long-awaited solution.

Marshall Fernholz, a PC network manager with the American Medical Association, puts it this way: "The PowerPC may relieve some of the problems that stem from having a mix of different interconnected hardware." Unfortunately, IBM and Apple PowerPC system designs have headed in different directions. Though the two companies are in negotiations to realign their PowerPC strategy, it will be many months before we see any company other than Apple manufacturing PowerPCs that can run both Mac and Windows software.

But the PowerPC's getting a run for its money from Intel's Pentium—the speediest of all PC microchips. Available in a growing number of top-of-the-line systems, the Pentium allows users to do their work faster than they can on any other platform this side of a UNIX workstation. Pentium-based machines provide a performance advantage that users crave. And in these get-it-done-yesterday times, there's no question that speed is supreme.



The Intel Pentium won Product of the Year, but the PowerPC took Most Promising Newcomer as the battle for speed heated up.

"Until the Pentium came along, it seemed like hardware couldn't keep up with the demands of software applications," says Ken Hedgecock, an executive field representative for the Better Business Bureau in Cedar City, Utah. "But now we finally have something that can run complex Windows, graphics, and multimedia applications without slowing you down. That's positively refreshing."

According to analysts, the PowerPC appears to have Intel running scared. That's surprising, given Intel's current dominance of the PC desktop market, says Amy Wohl, president of Wohl Associates, an industry research firm in Bala-Cynwyd, Pennsylvania. "Not an insignificant part of the fun of watching the pre-PowerPC announcement activities was watching Intel dash around trying to convince everyone that a Pentium chip, or the next Pentium chip, or the 686—or something with an Intel name on it—would definitely be a better deal than a PowerPC," says Wohl. "You'd think that with a virtual monopoly on the PC desktop market, whether on its own or through its clones, Intel wouldn't feel so insecure."

Just what effect the PowerPC will have on Intel's market dominance remains to be seen. But one thing is certain: We haven't seen the end of the race to produce the fastest chip ever.

—B.F.

▲ Computer Tools

Utility
Symantec Norton Utilities 8.0

File Manager
Central Point PC Tools 2.0 for Windows

Backup Software
Symantec Norton Backup 3.0

Shareware
PKWare PKZip 2.04

"As a road warrior, I'm dependent on my XJack."

Jerry Schneider *Schneider Associates*

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Coursey Predicts

Where will tomorrow's World Class products come from? Predicting anything in the PC business is tough, and I've got a few arrows in my back to prove it. But here's what I think the future holds.

When awards time rolls around next year, the Windows 4 operating system (a.k.a. Chicago) will be a contender—assuming it ships before then. Chicago probably won't be entirely problem-free, but it's been running on desktops at Microsoft for some time now, so I expect it to be reasonably stable.

The promise of Plug and Play portends easier installation of add-on cards, provided that hardware companies really do eliminate conflicts. Compaq is codeveloping Plug and Play with Microsoft, so it looks like Compaq may be a winner here.

And newspapers made headlines over what I call "stupid Internet tricks." Sure, better communication is important. But is the media fascination just a replacement for the attention viruses used to get? Viruses aren't any better or worse today, they're just not written up in *USA Today* so often. Will the Internet hype die next? That would be world class!

—David Coursey

◀ The Company Behind the Product

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Dell Computer

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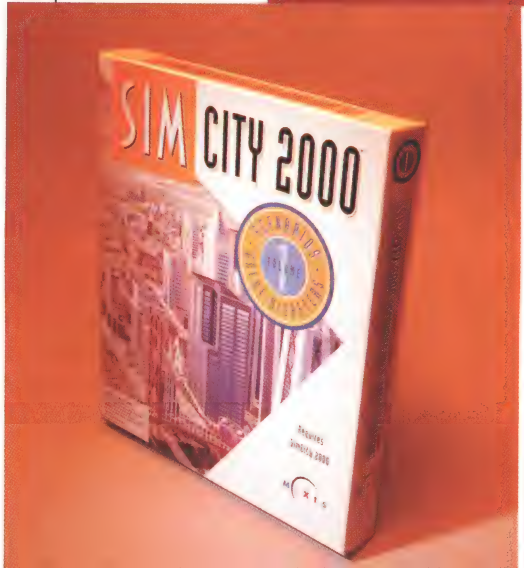
WordPerfect

Best Mail-Order Company
PC Connection

▼ Having Fun

Game (Non-CD ROM)
Maxis SimCity 2000



▲ Communicating

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Delrina WinFax Pro 3.0

Communications Software
Datastorm Procomm Plus 2.01 for Windows

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November 23, 1993
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- 7 expansion slots: 2 VESA, 7 ISA
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- Diamond Speedstar Pro VLB (1MB)
- 14" Micron 14G, 1024I, .28mm
- Desktop "Tool Free" chassis
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- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Works Multimedia on CD*

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EDITORS' CHOICE

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- 15" Micron 15FGx, 1280NI, .28mm, MPRII
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- MS-DOS & Windows for Workgroups
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- 512K write-back cache, Flash BIOS
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- 5 EISA, 2PCI, 1 EISA/PCI slots
- 2X SCSI-2 CD-ROM drive, 3.5" floppy
- PCI graphics accelerator (2MB)
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Image In Image Out

PHILIP KAAKE

Photos, drawings, documents, layouts, clippings—capture them all with today's color scanners. In our review of nine models for under $1000, two stand out as Best Buys.

By Scott Spanbauer

Flatbed scanner prices have finally fallen down to earth. The first desktop scanners cost more than $2000, were a pain to use, and offered only poor-quality gray-scale scanning. Today, for as little as $700, you can get a scanner that captures photo-realistic colors at very high resolutions. And while you may still experience installation woes, scanners are becoming simpler to use with a variety of applications.

The scanner is an invaluable source of raw material for digital darkroom tools, such as Adobe Photoshop and Fractal Painter, that let you manipulate photographic images and create effects that would be impossible to achieve using traditional methods. But scanners are not for graphic

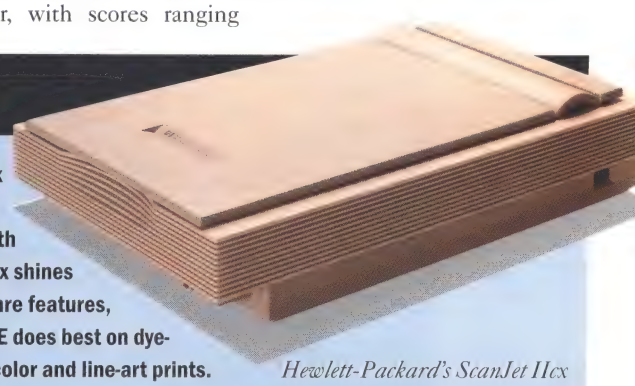
artists alone. Business professionals can use photos to spice up reports, presentations, and newsletters; create image databases; and take full advantage of document viewers like Adobe Acrobat. For the cutting-edge small office or work group, scanners work with OCR software to turn piles of printed data into editable, searchable text; provide the missing variable in the fax-modem equation by letting you input paper-based documents; stand in for copiers; and provide the doorway to archival document storage.

This review covers nine scanners that sell for less than $1000 and are capable of at least 300-dots-per-inch (dpi) scans in both color and gray scale. We evaluate units on scanned image and OCR quality, price, ease of use, speed, bundled software, and features. While we selected products we thought offered the best value to business users, other models in this price range are available from the vendors in this review as well as from other companies.

All units reviewed provide photo-quality 24-bit color, 8-bit gray-scale, and black-and-white line-art scanning of letter-size originals at 300 dpi; five are capable of scanning legal-size originals, and three offer higher-resolution 400-dpi scanning mechanisms. All nine use technical tricks such as interpolating intermediate values to generate higher resolutions. Each scanner comes equipped with bundled third-party utilities and a TWAIN-compliant scanning module (TWAIN, a scanning application programming interface with an acronym that by all accounts stands for nothing, is discussed further on).

Best Buys

Hewlett-Packard's ScanJet IIcx and Umax's UC630LE win Best Buys for their overall value. Both are fast and easy to use. The ScanJet IIcx shines on gray-scale output and bundled software features, whereas the UC630LE does best on dye-sublimation color and line-art prints.



Hewlett-Packard's ScanJet IIcx

Two of the scanners emerged with Best Buy honors: Hewlett-Packard's ScanJet IIcx and Umax's UC630LE. While both units fell short of perfection, they managed to nose ahead of the competition. The ScanJet IIcx excels in gray-scale scanning, speed, and bundled software. The low-cost UC630LE handles color images with finesse. Both scanners are easy to install and use.

Umax's UC630LE

Caught in the Act

The PC World Test Center put all nine scanners through image quality, OCR, and speed tests. For image quality testing, we captured images of a color photo, a black-and-white photo, and line art at each scanner's maximum optical resolution using Adobe Photoshop 2.5 and each scanner's included TWAIN-compliant scanning module. Before scanning, we cropped each image as closely as possible to the original size and selected an auto-exposure feature if available. A panel of graphic arts professionals and nonprofessionals assessed image quality by examining the printed output.

Your output device's quality greatly affects how your finished product will look. For example, 24-bit color scans look better when they're printed on a dye-sublimation printer—such as the Tektronix Phaser IISDX we used in our tests—than on an ink jet printer, because dye-sub technology blends colors better, which leads to smoother, clearer reproduction. However, many business users have access only to a low-cost color ink jet printer, such as the Canon BJC-600 we used. While our panel of judges evaluated both dye-sub and ink jet color output, we gave greater weight to the dye-sub prints, where differences in scanner quality are more apparent. We printed the gray-scale and line-art images on a 600-dpi HP LaserJet 4 laser printer.

Overall, the jury wasn't greatly impressed with the results. On a scale of 1 to 10, the average score for all three output types (dye-sub, ink jet, and laser printer) was somewhere between 5 and 6, with individual scores ranging from 3 to 8. None of the reviewed scanners did a great job of simultaneously reproducing the original image's hues (in the case of color images), brightness, and contrast using the default settings. And the output uniformly lacked detail and appeared fuzzy. Most judges rated line-art reproduction much higher, with scores ranging from 5 to 9, with an average of 7.5. The Umax UC630LE handled color best, the Envisions ENV8100 and HP ScanJet IIcx tied for best gray-scale scans, and the ENV8100 won on line art.

You can improve the appearance of your output by changing your software settings—preferably with the tools provided in the TWAIN scanning module—before you make your scan, but also by using image editing software after scanning. Images that appear too yellow, blue, or red can be easily corrected. You can also correct images that are too dark or too bright. To get the best possible final results, make your adjustments at the time of scanning using the TWAIN module.

Speeding It Up

While speed might seem a secondary concern, the process of getting a scan just right often requires several iterations. And using OCR software with your scanner—even with an automatic document feeder—usually involves multiple scans. If you scan images and documents on a regular basis, choose one of the faster scanners.

In image scanning, the speedy HP ScanJet IIcx performed scans about 2.5 times faster than the Tamarack ArtiScan 6000C, which is the slowest of the units with SCSI adapters. The slowest scanner of all, the Epson Action Scanning System, uses a bidirectional parallel port adapter, which transmits data more slowly than a SCSI

adapter; its scan times were actually 3.5 times slower than the fastest unit. The Action Scanning System finished last in all image scanning except for line art.

Several issues contribute to scanning speed. Scanners that perform color scans in one pass over the original instead of three tend to finish more quickly, as do those that use the SCSI II interface. Also, scanning at 400 dpi is generally more time-consuming than at 300 dpi, because the scanner is capturing more data at the higher resolution. Nevertheless, other aspects of scanner hardware and software design affect speed, as evidenced by our testing: Two of the three 400-dpi scanners, the HP ScanJet IIcx and the Canon IX-4015, are also the fastest, while the three-pass UC630LE outperforms the remaining one-pass scanners. See the PC World Test Center Report for performance scores.

Don't Forget OCR!

OCR performance varied from 7 to 17 character errors in our 535-word document, with accuracy rates ranging from 98.5 to 98.8 percent. Our test consisted of scanning a photocopied newspaper article, performing OCR with OmniPage Professional 2.11, and counting errors. We couldn't include OCR speed in our overall ratings because compatibility issues required us to use different methods to capture the original image.

Tips for Top Scans

Start with a good original.

Scanning utilities and image editing programs give you plenty of control over image brightness, contrast, and hue, but they can't work miracles. Photographs that are out of focus, poorly exposed, or dirty may never look great, no matter how much time-consuming electronic retouching you do. Fixing line art with ink and correction fluid before scanning may be faster than using an image editor.

Keep it clean.

It's easier to clean dirt and flecks off your scanner's glass platen than to remove them from a scanned image. To protect the scanner's mechanism, spray glass cleaner onto a soft cloth, not directly on the scanner.

Select the right image type.

The image resolution, color depth, scaling, and cropping you choose before the final scan have a tremendous combined impact on the size of the final image. To choose the most efficient resolution, consider the output device: For most laser-printed photographs, 100 dpi is plenty; for high-resolution imagesetter halftoning, 300 dpi is a good rule of thumb. Line art generally should match the output device's resolution.

Scan single-color art (even if it isn't black and white) as line art, and black-and-white photos as gray-scale images (rather than color) to generate smaller files. Several scanning utilities offer a space-saving 256-color image mode good for nonphotographic color images or images destined for display on a computer monitor.

The best way to save space is to scan only what you need and crop out the rest.

Use your tools.

Use a calibration program to match your scanner to the target output device. If the scanning program has an auto-exposure button, that will probably provide the best-looking results on well-exposed originals. Brightness and contrast tools let you adjust the look of the photograph as a whole. If most of the photo is fine, but one area, such as a bright sky, needs toning down, you can use highlight (and shadow) tools or a gamma-correction curve to fix just that area.

Making Sense of Resolution

The scanners reviewed here are limited to 300- or 400-dpi optical scanning (the number of pixels physically sampled). To take better advantage of high-resolution printers, the scanning software can increase resolution through *interpolation*. Interpolation increases image resolution by creating new pixels and assigning intermediate tonal values to them based on adjoining, optically scanned pixels. Bear in mind, however, that interpolated scans won't look as good as optical scans at the same resolution, because with interpolation the software manipulates existing information instead of receiving new, unique data from the original image. Your results will vary with the image, resolution, and output device, so the only way to accurately evaluate interpolation is to try it.

Although these scanners are capable of resolutions far higher than 400 dpi, photographic scanning seldom requires a resolution higher than 300 dpi. You actually only need to scan photos at 100 dpi for a 300-dpi laser printer, 150 dpi for a 600-dpi laser, and 135 dpi for a 360-dpi color ink jet. A 300-dpi dye-sublimation printer requires only 150-dpi scans. Scanning at resolutions higher than required by your output device wastes disk space and processor time without improving the image's appearance. What's the point of performing high-resolution scans? For one thing, you can enlarge an original image without losing image quality, such as in transparency scanning. (All but the Canon and AVR scanners offer transparency adapters.) You also should scan line art at the same resolution as your output device's to avoid jaggies.

While you probably won't be scanning color or gray-scale images larger than 8.5 by 11 inches, larger-format platens (scanning surfaces) let you scan legal-size forms. However, unless you need this larger size, consider something smaller. Desktop space is limited, and most of these scanners are big, consuming as much space as the average desktop computer (excluding the monitor). The Canon IX-4015 is one-third smaller, at just 11 inches wide and 16 inches deep. While its scanning area is limited to letter size, so are the platens of much bulkier scanners from Epson, Microtek, and Tamarack.

Make It Easy

While quality is essential in a good scanner, so is easy installation and use. Clear instructions on installing the SCSI board, connecting the cable, and unlocking the unit's scanning mechanism are immensely helpful. And the manuals shouldn't assume you're an expert in the perverse science of resolving IRQ, DMA, and other PC hardware conflicts. The most common problems we encountered were memory address and interrupt conflicts. The ENV8100, ScanJet IIcx, and UC630LE were the easiest to install, because the instructions were clear and we didn't have to set jumpers or manually modify any system files to make them work.

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"This Cyrix upgrade is easily fitted in 15 min, and then the user is up and running with all the old software and data files unaffected. There is no learning curve or disruption for the user – it is only necessary to get used to the fact that the computer does everything twice as fast as before."

–Personal Computer Magazine (UK), November 1993

"Simply plug in the Cyrix 486 upgrade to a 386 motherboard and you'll crank up performance by better than 60%..."

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"Cyrix has developed inexpensive upgrade chips for 386-class personal computers...and the effect will be like dropping a Corvette engine into a Ford Escort... We decided to try one of the Cyrix chips. The result was impressive...Think about how much a small company could save."

–Barry Cooper, The Orlando Sentinel, February 10, 1994

"Priced at under $300, the upgrade will nearly double the performance of that creaky old 386SX a few of you still use."

–PC Magazine, February 8, 1994[1]

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"The Cyrix Cx486SRx² 386SX upgrade chip cleverly does something which everyone thought was impossible...a single-chip upgrade for 386SX machines..."

–Personal Computer Magazine (UK), January 1994

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–Computer, November 1993, IEEE Computer Society

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–WordPerfect the Magazine, December 1993

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–Windows Magazine, The Win 100: The Best Windows Products of the Year, February 1994³

"Performing an upgrade on a full-size Toshiba laptop computer required less than two minutes...The system booted without problem and showed dramatic improvements in overall computational performance and disk I/O."

–Computer Reseller News, Joel Shore, August 16, 1993

"Cyrix's clever design makes it possible to upgrade nearly any 386 in existence, without hassle or high cost...All you need is a fast, affordable upgrade for an office of 386s. The Cyrix Cx486SRx² is it. Just plug it into your s386 system and go."

–PC Computing, December 1993²

"Cyrix's solution is simple. You remove the existing 386 chip from its socket, plug in the Cx486DRx² and run some software."

–PC Magazine, October 13, 1993²

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–Raw Bytes, Frank Delaney KPBX FM 91.1, National Public Radio

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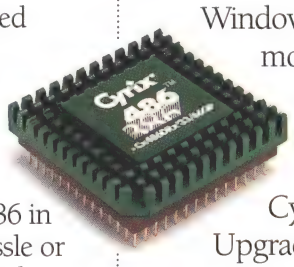

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Circle 92 on reader service card

It's the Software, Silly

Controlling the actual scanner hardware requires a program. Most manufacturers have adopted TWAIN, which ensures that scanners work with most image editing, desktop publishing, and OCR software. Unfortunately, TWAIN is an evolving standard, and incompatibilities occasionally arise between applications and TWAIN drivers. We encountered TWAIN incompatibilities with several scanners but were usually able to overcome them.

Even if you scan only from a bundled image editing or OCR application, you'll still need the tools in the TWAIN-compliant scanning utility. When you attempt to acquire an image in Photoshop, for example, a window pops up on screen that gives you the tools to capture your image. This window isn't part of Photoshop; it's TWAIN-compliant software designed by the scanner manufacturer to work directly with the scanning hardware. Since each manufacturer writes its own TWAIN software (or hires a third party to do it), the scanning tools available vary from product to product, even if you're working within the same host application (Photoshop, in this case). Only the Canon IX-4015 also comes bundled with full-featured scanning software that doesn't require the TWAIN application programming interface.

Most TWAIN modules provide a range of tools that let you make the most of your original image, albeit with some effort. Auto-exposure tools automatically choose the optimal brightness for your image. For best output, learn to use other controls as well. All TWAIN modules provide separate brightness and contrast controls, and most also let you pick the brightest and darkest points in the image in order to enhance midtone detail. Many TWAIN scanning modules use more advanced tools to let you adjust color hue and bring out detail in particular regions.

All scanners reviewed here come with one or more bundled applications. To keep the overall price in check, we evaluated each vendor's simplest bundle. Before you make your purchase, however, ask about other available bundles.

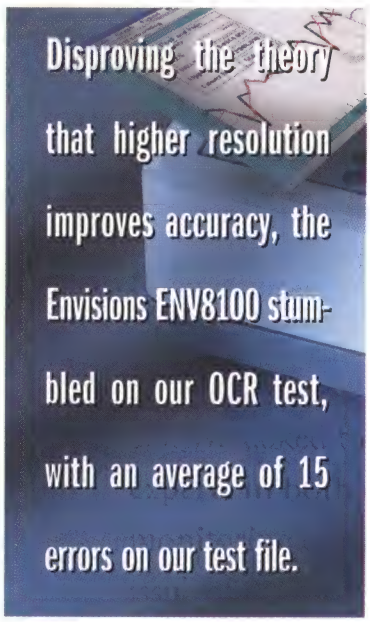
A color calibration program—which comes standard with the Canon, HP, and Microtek scanners—can ease color or gray-scale imaging by helping your scanner reproduce colors more accurately.

Make Sure You're Covered

Long telephone support hours, a toll-free number, a 30-day money-back guarantee, and a minimum one-year warranty help reduce frustration should things go wrong. Only Envisions and Tamarack provide a 30-day money-back guarantee; AVR and Mustek stand out for providing two-year warranties.

Scott Spanbauer is a contributing editor for PC World. *Testing was performed by Ulrike Diehlmann. Research and support were provided by Anita Hamilton, Caroline Jones, and Gary Van Der Horn.*

For more information about all products in this article, circle reader service no. 905.



AVR 3000/CLPlus

PROS: Low cost, accurate OCR performance, two-year warranty
CONS: Poor color reproduction on dye-sub prints, limited TWAIN interface, slow

AVR's flatbed is a bargain at $699—it shares lowest-price honors with Umax's UC630LE. It also landed at the slow end of the speed spectrum. Our panel of judges ranked the 3000/CLPlus's bright gray-scale images and line-art output better than average. The scanner's color performance on dye-sub prints garnered lower marks, mostly due to loss of detail in highlight areas and a yellow tinge. Our judges rated the unit's ink jet output as above average. OCR performance was outstanding, however, with just nine character errors in our 535-word test document.

Installing the 3000/CLPlus can be tricky. If the included Adaptec AHA-1510 SCSI board conflicts with your existing hardware, you may have to use the manual to reset the tiny IRQ and address jumpers. The software installation program doesn't sense these kinds of hardware adjustments, however, and simply fails. The manual explains the solution, but most people will probably call tech support first.

AVR's EasyScan 4.2 TWAIN module is the only interface besides HP's DeskScan II that you can run as a stand-alone scanning program. However, it lacks several important features of the best TWAIN programs, including an auto-exposure button and the capability to preview scans in color. Oddly, the program offers color brightness and contrast controls, but without color preview you must perform the final scan, then view the results in another program to judge the effect of color corrections. It also lacks a zoom feature, which makes it hard to assess other image adjustments with accuracy. We encountered difficulty scanning line-art images, which always displayed with black-and-white colors inverted.

You may be able to overcome many of the 3000/CLPlus's image quality and interface shortcomings with the bundled Photoshop LE 2.5, which offers all but the most advanced features of the complete Photoshop program. AVR also provides a two-year warranty. *AVR Technology, 800/544-6243, 408/434-1115* **Reader service no. 727**

Canon IX-4015

PROS: Compact, fast, accurate OCR platform
CONS: Pricey, poor color image quality

Canon's sleek scanner provides great black-and-white output. Our judges ranked its sharp line art nearly the best in quality, and the IX-4015's OCR accuracy is unmatched—just seven errors in our 535-word test document. However, both color and gray-scale images appeared quite dark, and color scans tended to be too blue. Second only to HP's ScanJet IIcx in speed, the Canon is also seductively small and easy to install. However, this $995 scanner is also the most expensive one reviewed here.

Part of the IX-4015's problems in producing high-quality images may be due to its bare-bones TWAIN scanning interface—which

The Proof's in the Scan

Scanning technology continues to improve, but the discerning eye will easily note the difference between the original photos and scanned renditions digitized using each scanner's default software settings. None of the scanned images is as sharp as the original, or faithful to the original's brightness, contrast, and color balance. For the best scans, learn the tools of the trade and adjust brightness, contrast, and hue at the time of scanning. The TWAIN scanning modules bundled with each scanner contain all the tools you'll need. Image editing software can also be helpful.

Original

AVR 3000/CLPlus

Canon IX-4015

Envisions ENV8100

Epson Action Scanning System

HP ScanJet IIcx

Microtek ScanMaker IISP

Mustek Paragon 600

Tamarack ArtiScan 6000C

Umax UC630LE

lets you choose image resolution, adjust brightness and contrast, and set gamma correction. (Gamma correction is a process that adjusts one range of tones, such as shadows, while leaving others unchanged.) The IX-4015 lacks both zoom and auto-exposure controls, and it's also the only scanner that doesn't include a separate image editing program, substituting instead a wonderful, non-TWAIN-compliant scanning utility called Ofoto for Windows.

Ofoto enables you to calibrate the scanner to your printer or display and offers both auto-exposure and auto-cropping; the latter feature automatically selects the likely portion of the image you'll scan. Ofoto builds in scanning intelligence, using preset target calibrations that maximize image quality for the given output device while minimizing image size. Though the software is targeted at nonprofessionals, you can customize Ofoto's printer calibrations for almost any printing process; in fact, the Ofoto manual itself was produced this way. The manual discusses the entire calibration process in detail, even for four-color offset printing. *Canon Computer Systems, 800/848-4123, 714/438-3000* **Reader service no. 728**

Envisions ENV8100

PROS: Good gray-scale, line-art, and color ink jet prints; easy installation
CONS: Slow scanning

Moderately priced at $799, but dead slow, Envisions' 400-dpi scanner did the best job of reproducing line-art minutiae and a wide range of tones and shadow details in gray-scale images. Our judges found that color images printed on the dye-sub printer showed the right level of brightness but were too yellow or red. This scanner earned the third highest scores on scans printed with a color ink jet. Disproving the theory that higher resolution improves accuracy, the ENV8100 stumbled on our OCR test, with an average of 15 errors on our short test document.

Installation is a simple matter: Just plug in the SCSI board and cables, run the install program, and it works. The ENV8100's TWAIN interface looks like HP's, with an auto-exposure button, highlight and shadow controls, and gamma correction. The bundled Image Folio image editing utility is comparable to programs such as

Aldus PhotoStyler SE or Micrografx Picture Publisher LE that are included with competing scanners. Photoshop LE is available as an extra-cost option. The scanner also comes with Xerox Imaging Systems' minimal TextBridge OCR program. *Envisions Solutions Technology, 800/365-7226, 415/692-9061* **Reader service no. 729**

Epson Action Scanning System

PROS: Good color scanning quality

CONS: Slow on all but line-art scans, poor OCR performance

Epson's Action Scanning System is priced to move at $799. Its color capabilities are second only to Tamarack's, according to our judges, who found the dye-sublimation printer output washed out, yet true to the original in contrast and tone. Most found the Epson's gray-scale images unacceptably light but were happier with its sharply detailed line-art reproduction. Ink jet prints were above average. The Action Scanning System turned in the least accurate OCR performance, with 17 character errors in our 535-word test document.

Our Test Center encountered numerous incompatibilities when acquiring images with Photoshop, including image files that contained only half the expected image data, general protection faults in Windows printer drivers, and extremely slow performance. The Action Scanning System's poor performance can be partially attributed to the unit's parallel port adapter, which transmits data more slowly than the SCSI adapters that come standard with all other scanners reviewed here. If you thought that this parallel port connection would mean that the Action Scanning System would be easier to install than scanners using a SCSI adapter, think again. While all PCs come with a parallel port, few of those ports support bidirectional data transmission. So unless you already have a bidirectional parallel port, you'll need to install the board supplied with the unit yourself.

The Action Scanning System's TWAIN scanning interface is bare-bones: It features brightness and image-sharpening controls but no auto-exposure, zoom, contrast, or highlight and shadow selection tools. The bundled software helps make up for other shortcomings—Picture Publisher 4.0 LE doesn't offer all of Photoshop LE's fancy filters, but it comes close. Xerox Imaging Systems' TextBridge 2.0 LE OCR program is more basic: It neither displays the scanned page before recognizing text, nor lets you select or skip page regions. Still, it does the job. *Epson America, 800/289-3776, 310/782-0770.*

Hewlett-Packard ScanJet IIcx

PROS: Fastest scanner reviewed, top gray-scale quality, easy installation

CONS: Color images too yellow, worst line-art reproduction of the group

The 400-dpi ScanJet IIcx is the latest in a long line of champions, but it still had to work hard to earn its Best Buy. Its $975 street price is higher than any of the other reviewed scanners' but the Canon's, and it was way off the color mark on dye-sublimation prints, rendering our original image with a distinctly yellow hue. OCR performance was slightly below average, and line-art reproduction was worst of all. Countering these problems, the HP is the fastest scanner reviewed, and our judges found its gray-scale images bright, detailed, and rich. Ink jet output rated among the best for its rich colors.

Installing the ScanJet IIcx is a snap, thanks to guides to installing both the scanner hardware and the DeskScan II TWAIN scanning interface. DeskScan II is one of the most complete scanning utilities reviewed, second only to Ofoto (bundled with Canon's IX-4015). The program not only offers auto-exposure but also automatically finds and crops previewed images and determines the proper image type (color, gray scale, or black and white). In addition to brightness and contrast, highlight and shadow selection, and gamma-correction tools, DeskScan II lets you zoom, flip, and invert images and adjust color hue and intensity as you would on your TV. Like Ofoto, DeskScan II also adjusts each image to best match your output device (a feature called *print paths*) and lets you print a calibration test sheet and scan it back in for best results. The ScanJet IIcx also comes with a copy of Aldus PhotoStyler LE 2.0. *Hewlett-Packard, 800/722-6538* **Reader service no. 731**

Microtek ScanMaker IISP

PROS: Includes color calibration and document management software

CONS: Excessively dark default scanning

The $799 price is certainly right, but the ScanMaker IISP offers only middle-of-the-road image quality and performance. While line-art reproduction was fairly good if a bit dark, most reviewers found the color and gray-scale images too dark, with a significant loss of detail in shadow areas. OCR accuracy was average.

Installing the ScanMaker IISP began well, thanks to clear instructions on installing the board, connecting the cable, and unlocking the scanner before use. However, things went awry when the installation software failed to detect that DOS's EMM386.EXE memory manager was using the SCSI adapter's ROM address to load programs, which resulted in a failure. The solution, not mentioned in the documentation, is to exclude the conflicting addresses on the EMM386.EXE command line in CONFIG.SYS and in the [386Enh] section of Windows' SYSTEM.INI file. This kind of conflict drives most PC owners nuts—or to tech support lines.

The ScanMaker's TWAIN interface matches nearly every advanced feature found in its competitors' scanning programs, including auto-exposure, brightness and contrast, and gamma-correction tools. An output-matching feature similar to HP's print paths lets you choose from among several monitors and printers as output devices.

The scanner comes bundled with Microtek's proprietary calibration program, Photoshop LE, and Caere's Personal PageKeeper Portfolio OCR and document management software. The latter program, in addition to giving you plenty of control over page regions to be scanned, indexes recognized text and then places it into a searchable database. *Microtek Lab, 800/654-4160, 310/297-5000* **Reader service no. 732**

continued on page 146

SO WHAT DO YOU WANT FOR $2,999?

THE PRICEPOINT WEEKLY

Dell's Pentium entry leads pack in price, value

By Randy Wussler

Dell Computer Corp. instantly leapt into the price leadership position of the Pentium market with the release of the 90MHz Dimension XPS P90.

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PC Week, April 25, 1994

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Circle 228 on reader service card

Mustek Paragon 600

PROS: Low price, two-year warranty

CONS: Poor default image quality, poor OCR performance

The Paragon 600 is attractively priced at $725, but aside from its acceptable line-art reproduction, it couldn't match the quality of most competing scanners. Our judges found its color images excessively dark and too red or yellow; gray-scale images were likewise too dark. The gray-scale and ink jet output suffered from a loss of detail in the gray tones. Mustek's OCR accuracy was one of the worst in the review, and scanning speed was middling.

Hardware installation is swift, thanks to a quick-start guide. Software installation turned into a minor nightmare, due to conflicts with the EMM386.EXE memory manager's upper-memory usage. The installation program told me to change a switch setting on the interface board and even showed that setting. Using this setting prevented the computer from booting, and subsequent suggestions from the program also failed to work. After much changing of addresses and rebooting, we simply reset the board to its default settings and excluded the appropriate addresses in the CONFIG.SYS and SYSTEM.INI files. Anybody using memory management with Windows will likely encounter the same problem.

The Paragon 600's TWAIN interface is less complete than most, offering brightness, contrast, and gamma-correction controls, but no auto-exposure or zoom tools. The inability to zoom, combined with the tiny preview image display, makes it tough to use the few available tools. You'll probably end up performing final scans and previewing them in the host image editor, which is more time-consuming. Also, you cannot move the selection box around: You have to resize the current selection one corner at a time to crop images properly, a small but irritating omission.

Bundled software includes Photoshop LE and Ocron's WordLinx OCR software. WordLinx lacks PageKeeper's nifty text database, but it offers a great interface that finds text areas and lets you discard the ones you don't want to scan. *Mustek, Inc., 800/468-7835, 714/453-0110* **Reader service no. 733**

Tamarack ArtiScan 6000C

PROS: Good color reproduction on dye-sub prints, full version of Photoshop bundled

CONS: Ink jet output and OCR below average, slow performance, noisy

Tamarack's ArtiScan 6000C gets off to a good start with a moderate $795 price. However, Tamarack's OCR performance falls far behind that of the leading scanners, with an average of 14 errors in our 535-word test document, and it's the second slowest scanner in the review group. It's also noisy, making a grinding sound at the end of its prescan transit, and a louder grinding noise during final scans.

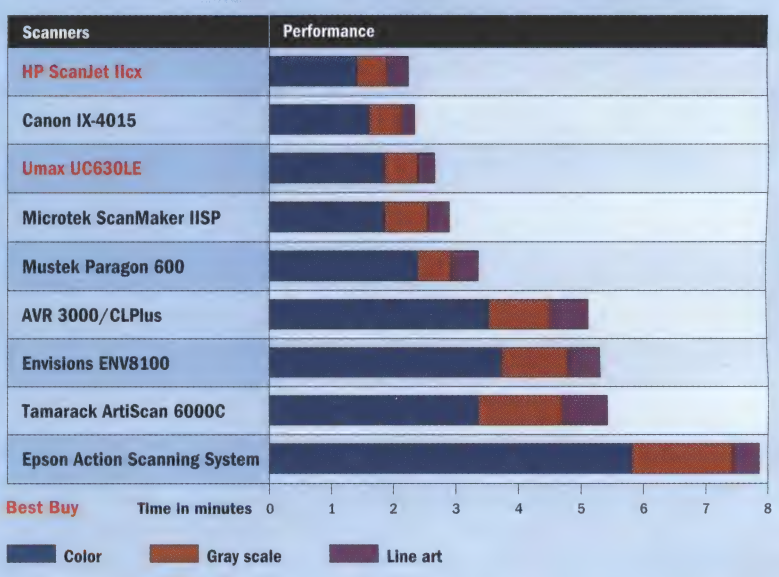
Images produced on a dye-sublimation printer were a little dark overall but generally faithful to the original's brightness and colors. Judges found the scanner's gray-scale images a bit too dark and contrasty, and line art was dark and a little blotchy. Ink jet output was gray and muddy.

While our Test Center found the installation instructions in the manual confusing, the rest of the manual is clear and easy to understand. The TWAIN scanning interface offers brightness, contrast, gamma-correction, and zoom controls. However, it doesn't provide an auto-exposure button. Tamarack bundles the full version of Photoshop, the best image editing tool currently available, but doesn't include an OCR program.

In gray-scale scanning, the TWAIN software ignored the selection tool and simply scanned the entire platen area—both in previews and in final scans. This problem didn't occur, however, with color scans or line art. *Tamarack Technologies, 800/643-0666, 408/956-0144* **Reader service no. 734**

PC WORLD TEST CENTER REPORT

HP and Canon Whiz Past the Competition



Scanners are arranged in order of overall speed, from fastest at the top to slowest at the bottom. Test results are measured from the time we issued the scan command to the time the status bar and Windows hourglass disappeared.

Methodology
Using Adobe Photoshop 2.5 and each scanner's TWAIN-compliant scanning module on a Polywell 486DX2-66 with 8MB of RAM and a 4MB Number 9 GXE graphics accelerator, we scanned a 5-by-7-inch color photo at each scanner's maximum optical resolution and color depth (24 bits at either 300 or 400 dpi). We scanned a black-and-white version of the same photo at a corresponding resolution (8 bits at either 300 or 400 dpi). We also scanned a detailed 8¼-by-10¾-inch black-and-white image from a clip art book (1 bit at 300 or 400 dpi). In all three cases, we selected an auto-exposure feature, if available, before scanning, and cropped each image as closely as possible to the original size.

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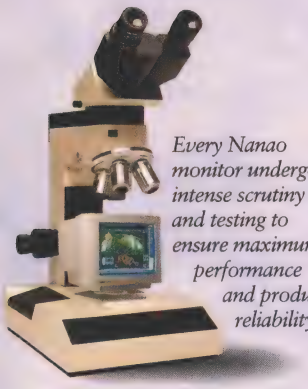

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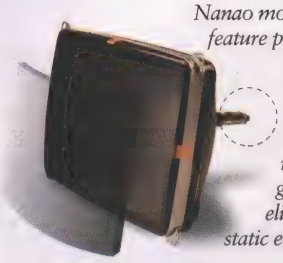

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T560i	17"	0.25mm	H:30-82kHz V:55-90Hz	1280x1024
F780i-W	21"	0.26mm	H:45-100kHz V:55-120Hz	1600x1200
F760i-W	21"	0.28mm	H:30-78kHz V:55-90Hz	1280x1024
F560i-W	17"	0.26mm	H:30-82kHz V:55-90Hz	1280x1024
F550i-W	17"	0.28mm	H:27-65kHz V:55-90Hz	1024x768
F340i-W	15"	0.28mm	H:27-61.5kHz V:55-90Hz	1024x768

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Circle 194 on reader service card

Umax UC630LE

PROS: Fast, good color reproduction, low price, easy installation

CONS: None

The Umax UC630LE excels in color reproduction and price. At first glance, Umax's scanner looks nearly identical to the Envisions ENV8100—and rightly so, since Umax makes both systems. Ease of hardware and software installation and the quality of the TWAIN scanning utility are equally great for both units. The similarities stop there, however: Umax's $699 scanner is a 300-dpi model (the ENV8100 is 400 dpi), it costs $100 less than the ENV8100, and it scans about twice as fast.

The UC630LE also scanned color images better than its higher-resolution cousin, creating balanced, bright color scans that got the best marks from our panel of reviewers on both ink jet and dye-sub prints. Gray-scale images displayed good brightness and contrast, and line art looked the best of all, despite a tendency toward jaggies. OCR accuracy was above average, with just ten errors on our 535-word test document. The UC630LE comes with Photoshop LE but no OCR program.

The UC630LE earned its Best Buy by performing either average or better in all aspects of our evaluation—image quality, price, ease of use, bundled software, speed, and service and support. While other scanners beat the UC630LE in specific areas, only the HP ScanJet IIcx rivals it for overall value. *Umax Technologies, 800/562-0311, 510/651-8883* **Reader service no. 735**

FEATURES COMPARISON

Scanners From $699

● Yes
○ No
n/a = not available

	AVR 3000/CLPlus	Canon IX-4015	Envisions ENV8100	Epson Action Scanning System	BEST BUY Hewlett-Packard ScanJet IIcx	Microtek ScanMaker IISP	Mustek Paragon 600	Tamarack ArtiScan 6000C	BEST BUY Umax UC630LE
Standard features									
Street price (including adapter)[1]	$699	$995	$799	$799	$975	$799	$725	$795	$699
Optical resolution (horizontal dpi x vertical dpi)	300 x 600	400 x 800	400 x 800	300 x 600	400 x 800	300 x 600	300 x 600	300 x 600	300 x 600
Maximum interpolated resolution (horizontal dpi x vertical dpi)	1600 x 1600	800 x 800	1600 x 1600	600 x 600	1600 x 1600	1200 x 1200	1200 x 1200	1200 x 1200	1200 x 1200
Scanning surface dimensions (inches)	8.5 x 14	8.5 x 11.7	8.5 x 14	8.5 x 11.6	8.5 x 14	8.5 x 11.7	8.5 x 14	8.5 x 11.7	8.5 x 14
Passes required for color scanning	3	1	3	1	1	1	3	3	3
Adapter type	SCSI	SCSI	SCSI	parallel port	SCSI	SCSI	SCSI	SCSI	SCSI
Number and type of connectors on scanner	2 SCSI II	1 SCSI II	1 SCSI I, 1 SCSI II	1 bidirectional parallel	2 SCSI II	2 SCSI II	1 SCSI I, 1 SCSI II	2 SCSI II	2 SCSI II
Bundled software									
TWAIN-compliant scanning module	EasyScan 4.2	●[2]	●[2]	Epson TWAIN	DeskScan II 2.0	TWAIN Scan Module	TWAIN Scan Module	●[2]	Umax TWAIN Driver 1.3
Image editing	Photoshop LE 2.5	○	Image Folio 1.0	Picture Publisher 4.0 LE	PhotoStyler LE 2.0	Photoshop LE 2.5	Photoshop LE 2.5	Photoshop 2.5	Photoshop LE 2.5
OCR/document management	○	○	TextBridge 2.0	TextBridge 2.0 LE	○	Personal PageKeeper Portfolio 1.24	WordLinx 1.1	○	○
Color calibration	○	Ofoto for Windows[3]	○	○	DeskScan II 2.0	Dynamic Color Rendition	○	○	○
Hardware options									
Automatic document feeder[1]	$397	$299	$399	$449	$475	$400	$450[4]	$490	$450
Transparency adapter[1]	n/a	n/a	$499	$749	$680	$529	$400[4]	$490	$450
Service and support									
Warranty length (years)	2	1	1	1	1	1	2	1	1
Toll-free technical support	●	●	○	●	○	○	●	●	●
On-site service	○	○	○	○	○	○	○	○	○
Weekday support (hours per day)	8	11	10[5]	12	11	10	9	8	9
Average turnaround on repairs (days, excluding shipping)	5	3	10	n/a	1	3	2	3	2
30-day money-back guarantee	○	○	●	○	○	○	○	●	○

[1] Estimated street price as of 3/1/94.

[2] TWAIN modules from Canon, Envisions, and Tamarack have no names but are included with purchase.

[3] Ofoto is scanning software that also performs color calibration.

[4] Product is due to be released in the third quarter.

[5] Eight hours on Friday.

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80 WINDOWS TIPS

...AND A FEW FOR DOS TOO

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What's this, *another* collection of Windows tips? How many more could there be? Plenty. *PC World* has been publishing tips for Windows 3.1 for more than two years now, but we're still uncovering new goodies. Take, for example, the simple act of opening Windows. You probably know you can bypass the Microsoft logo by typing WIN : to start Windows. But did you know this shortcut can make your system unstable, and there's a better way to achieve the same effect? Or consider the mouse. Using the latest Microsoft drivers with your old mouse could make navigating Windows easier than ever.

And so we give you the following 80 tips. Some are for Windows veterans, others are strictly for novices (see "The Top 20 Windows Tips of All Time"). We've also thrown in a few new DOS tips for good measure, plus some recommendations on great Windows utilities and illustrated examples of how three typical users (well, okay, they're editors) arrange their Windows desktops. Whatever kind of Windows user you are, we bet you'll find at least a couple of ideas here that will make using Windows easier. After all, it's never too late to learn a few new tricks.

Edited by Dan Miller

Keep It Clean

1 Using Setup as an Uninstaller. A full Windows installation is insatiable: It gobbles up huge chunks of disk space by installing a bunch of files you'll never need. If your Windows directory is looking a little bloated, you can slim it down with Windows Setup. Double-click the *Setup* icon in Program Manager and select *Options • Add/Remove Windows Components*. This will call up the Windows Setup dialog box, where you can specify the components you want to get rid of.

If you want to delete some README files, for example, click the appropriate *Files* button and follow the instructions in the resulting dialog box. As you uncheck boxes, Windows will display a running total of space you've liberated by removing the files. When you're done, click *OK*, then confirm your deletions. If you're ruthless, you can free up more than 5MB of disk space. You can always reinstall the deleted files from your Windows disks if you need them later.

2 Trim Your Font Lists. Although Windows can handle several hundred fonts, installing too many can slow your system and make it harder to find the typefaces you need. For everyday use, restrict yourself to a couple dozen installed fonts. If you need more for a specific project, install them for the time being and remove them when you no longer need them.

It's easy to delete the fonts you don't need using the Fonts module in the Control Panel. But before you start trashing fonts willy-nilly, there are a few things you should know.

• Don't delete any font if the word 'res' appears after its name in the Fonts dialog box. This means you should keep the Courier, MS Serif, MS Sans Serif, System, and Terminal fonts. Windows and applications use some of these bit-mapped fonts for menus and dialog boxes and others for windowed DOS apps.

• Hang on to Arial and Times New Roman. Many apps assume these common fonts are installed and use them as defaults.

• Be careful about deleting fonts installed by specific applications—the app may assume these fonts are available. You can usually identify them by a couple of capital letters at the beginning of their names on the font list. For example, fonts installed by WordPerfect for Windows are usually prefaced by the letters 'WP'.

• Don't delete any printer fonts. You can easily spot them because your printer's name follows the name of the font on your font list. Deleting these fonts could affect the way your documents appear on screen.

3 Weight Reduction for TrueType Fonts. For each TrueType font, there are two files for the base font (ARIAL.FOT and ARIAL.TTF, for example) and six others for "formatted" versions of the font; that is, bold, italic, and bold italic (in this example, ARIALBD.*, ARIALI.* and ARIALBI.*). If you don't require professional-quality fonts, you can delete these additional, formatted font files. You'll still be able to print in bold or italics; Windows will just generate these typefaces from the base font file. However, these generated variations won't look quite as good as the fonts from the deleted font files.

4 Two Files Aren't Better Than One. Because DOS and Windows both ship with their own versions of EMM386.EXE, EXPAND.EXE, HIMEM.SYS, MOUSE-.COM, MOUSE.SYS, RAMDRIVE.SYS, and SMARTDRIVE.SYS, you can end up with redundant copies of these files on your hard drive. To save disk space and improve performance, keep and use only the most current versions (Microsoft is constantly revising these programs, so the newer version is usually the better one). Delete the older duplicates and make sure your CONFIG.SYS and AUTOEXEC. BAT files refer to these files correctly.

5 Who Needs MOUSE.SYS? Windows automatically loads its own mouse driver when it starts, so unless you run DOS apps requiring a mouse there's no need to load a separate driver in CONFIG.SYS. Leaving it out will save some memory.

6 Deleting Duplicated DLLs. Windows comes with a passel of DLL files, and applications add plenty of their own. Unfortunately, some of the applications' DLLs duplicate DLLs you already have. If you find duplicate DLL files, move the most recent versions to your WINDOWS \SYSTEM directory and delete the others.

7 Not-So-Temporary Temp Files. Windows applications and utilities create lots of temporary files (with the extension TMP), which they should delete when the files are no longer needed. But if you exit Windows improperly—say your system crashes, you have to reboot, or you just turn off your computer without leaving Windows—those temp files may not get flushed from your hard disk.

OUR FAVORITE UTILITIES

Drag And File

One day, Microsoft will create a decent file manager for Windows—and pigs will fly. In the meantime, I'm using Canyon Software's Drag And File, a nifty shareware package that does things File Manager can't.

For instance, Drag And File's icon-happy tool bar lets me move, copy, or delete files and directories with a mouse click. I can associate a data file with more than one app so that when I double-click a TXT file, I can load it into any of the half-dozen text editors squirreled away on my hard disk. Best of all, Drag And File comes with some cool utilities for viewing and compressing files.

Of course, it isn't perfect. I can't expand or collapse the directory tree, it's a little slow on the redraw, and a few small bugs in the program still need to be squashed. But for $70, these are faults I can live with. • *Drag And File 1.0 $69.95; Canyon Software; 415/382-7999.* Reader service no. 748

—Daniel Tynan

Sometimes these leftover TMP files can be a blessing in disguise. If you crash your system and you lose the file that you're working on, take a look at the TMP files. They may contain data that would otherwise be lost.

However, if you're sure you don't need these files, there's no reason to let them consume precious hard disk space. Most temporary files should be found in the directory specified by the line 'SET TEMP=*directory*' in AUTOEXEC.BAT. However, stray TMP files can turn up in other directories as well. To get rid of them all, quit Windows to get to DOS (don't just shell out of Windows to the DOS command line), switch to the root directory, and type **DIR *.TMP /S**. Once you have the resulting list of the TMP files on your hard disk, you can delete them all.

8 Stripped-Down Control Panel. Even on a fast machine, the Control Panel takes its own sweet time launching. That's because it has to load a bunch of applets—Color, Desktop, Sound, and others. If you never use some of these applets (how many times have you needed International or MIDI Mapper?), why not save some time and some screen real estate by telling the Control Panel not to load them?

From Program Manager or File Manager, select *File*•*Run*. Type **CONTROL.INI** and then press **<Enter>** to open CONTROL.INI in Notepad. Move to the bottom of CONTROL.INI and add a section title, **[Don't Load]**. Under the new title, add lines that follow the format *module*=**TRUE**, where *module* is the name of the module you don't want to load. To get rid of the International module, for example, you add **International=TRUE**. When you're done, save and close CONTROL.INI. From now on, when you open the Control Panel it will contain only the icons you want to see.

9 Program Group Be Gone! Have you ever installed a Windows program only to regret it a minute later? What's the quickest way to banish it from your desktop? You simply minimize the offending program group, click its icon once to highlight it, then press **<Esc>** and **<Delete>**. Confirm the deletion, and the group—as well as all its icons—disappears from your desktop. Remember to remove the actual program files from your hard disk as well.

The Top 20 Windows Tips of All Time

10 Want to maximize a window? Double-click the title bar—it's easier to hit than the Maximize button.

11 If you're already typing, there's no need to move your hand to the mouse to navigate menus. Just press <Alt>, then the letter underlined in the menu's title on the menu bar. You can also hit <Alt>, then use the cursor keys to maneuver from menu to menu.

12 If your fingers are already on the keyboard, press <Enter> to select OK in a dialog box instead of using the mouse.

13 You don't have to click *Cancel* when you've mistakenly opened a dialog box. Press <Esc> instead. This will also cancel any drop-down menu.

14 Those long and short horizontal bars in the upper left corners of the application and document windows access control menus. From the keyboard, press <Alt>–<Space> to open the application's control menu and <Alt>–<Hyphen> to open the document's control menu.

15 Switch from one application to another by holding down the <Alt> key and pressing <Tab>. If you have several apps open at the same time, you can press <Tab> repeatedly to cycle through them.

16 Move program icons from one Program Manager group to another by dragging and dropping. To copy an icon, hold down <Ctrl> while you drag it.

17 You can usually cycle through the windows in an application by holding down <Ctrl>, then tapping the <Tab> key.

18 Here's how you can associate a document with its application: Highlight a document in File Manager, then select *File*•*Associate*. With the document's extension in the Files with Extension box, pick the name of its application from the list. If you don't find it there, use *Browse* to find it. When the correct application is in the Associate With box, just click *OK*.

19 Press <Ctrl>–<Esc> or double-click on the exposed surface of the desktop to call up Task Manager's list of open applications.

20 To copy a file in File Manager, put the mouse pointer on the file's name in the file pane, hold down the left mouse button and <Ctrl>, and drag the file to the appropriate directory in the tree pane. To move a file, do the same thing, but hold down <Alt> or <Shift> instead of <Ctrl>.

21 To launch a program every time you start Windows, copy its icon into the StartUp group. To bypass the StartUp group, hold down <Shift> while Windows is launching; programs in WIN.INI's run= and load= lines will still run or load.

22 In most apps, you copy, cut, paste, and undo using <Ctrl>–C, <Ctrl>–X, <Ctrl>–V, and <Ctrl>–Z, respectively.

23 Create hot keys to launch applications from Program Manager. Highlight the application's icon, press <Alt>–<Enter>, tab down to the Shortcut Key box, then press the key combination you want to use.

24 When selecting files in a Windows drop-down list, hold down <Shift> to select an adjacent group of files, <Ctrl> to select a nonadjacent group.

25 Use SYSEDIT.EXE, located in WINDOWS\SYSTEM, to open your CONFIG.SYS, AUTOEXEC.BAT, WIN.INI, and SYSTEM.INI files for editing.

26 Don't shell out to the DOS prompt to run DOS applications; use Program Manager instead. Add the DOS app to a program group just as you would any Windows app.

27 Add items to a program group by dragging the files you want from File Manager to the appropriate Program Manager group.

28 To toggle between full-screen and windowed views when you are running a DOS app from Windows, press <Alt>–<Enter>.

29 To shell out to DOS from File Manager, select *File*•*Run*, type COMMAND, then press <Enter>.

DOS Meets Windows

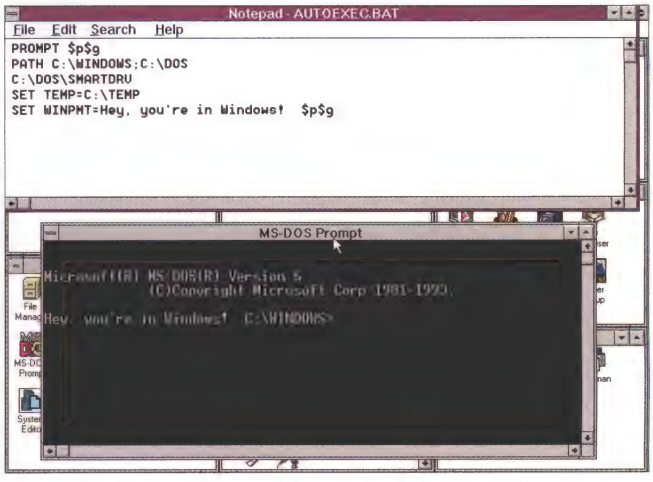
30 Buffers and SmartDrive. If you use SmartDrive, set the BUFFERS=*xx* statement in CONFIG.SYS to 10 or less: Buffers may improve disk access times, but they take up precious memory. If you don't use SmartDrive, try **BUFFERS=20**.

31 The Shortest Path. If you use Windows apps primarily, you may not need a long PATH statement in your AUTOEXEC.BAT file: Much of the time, PATH=C:\WINDOWS;C:\DOS will suffice. That said, if a Windows app adds its directory to your PATH statement during installation, don't get rid of it.

32 Where Am I? Ever forget whether you're in straight DOS or just running a DOS session in Windows? Try changing the prompt for your Windows DOS sessions. In AUTOEXEC.BAT, add a line like **SET WINPMT=Hey, you're in Windows! pg**. From then on, the prompt will tell you when you've shelled out to DOS from Windows.

33 Promptless DOS. If you can do without the screen that pops up when you shell out to DOS from Windows, the one that reminds you to type EXIT to get back to Windows, add **DOSPromptExitInstruc=Off** on its own line in the [386Enh] section of the SYSTEM.INI file.

34 Newer Is Better for MSD. You may already know about the Microsoft System Diagnostic utility, aka MSD, that comes with both DOS 6.*x* and Windows 3.1. From the DOS prompt (not in a Windows DOS session), type **MSD** to get screenfuls of information about your IRQs, COM ports, memory, and other minutiae. Like many other Microsoft utilities (see Tip 4), MSD is included with both DOS and Windows. If you have DOS 6.*x*, use its version of MSD; it's more up-to-date than the Windows 3.1 version. By deleting MSD.EXE and MSD.INI in your Windows directory and retaining the copies in your DOS directory, you can free up more than 152K of hard disk space.



AM I IN DOS OR WINDOWS? Keep track of where you are by specifying a different DOS prompt for your Windows DOS sessions (see Tip 32).

35 MSD Switcheroo. When your PC acts up, you may appreciate some little-known switches you can use with MSD.

- If you're having problems with your display, type **MSD /B** at the DOS prompt. The /B switch forces MSD to run in black-and-white instead of color.
- If MSD won't run at all or it runs improperly, try starting it with the command **MSD /I**. The /I switch forces MSD to skip initial hardware detection.
- To send an MSD report to a file, you can type either **MSD /F** *drive:\path\filename* or **MSD /P** *drive:\path\filename*. In both cases, if you don't include *drive:* and *path*, MSD will send the report to a file in the current directory. The /F switch causes MSD to ask for your name, address, and other data, which it will include in its report. (This can be handy if you're checking a bunch of different systems.) The /P switch writes an MSD report to a file without asking for any user information.
- Finally, you type **MSD /S** *drive:\path\filename* to write a short summary report to a file. If you enter just **MSD /S**, the report is sent to the screen.

36 Virtual TSRs. If you want to run a DOS app from Windows, and if that app requires a TSR, don't load the TSR from your AUTOEXEC.BAT. If you do, the TSR will take up memory during your entire Windows session. Instead, create a batch file to launch the TSR and then the app. When you're ready to use your application inside Windows, run the batch file. That way, the TSR takes up memory only while the DOS application is running; when you close down the DOS app, Windows will close down the TSR as well.

37 Magic Marker. Marking and copying text in a DOS application within Windows is a pain. Normally you mark the text, click the horizontal bar in the upper-left corner of the DOS box, then select Edit and Copy. To save some steps, try this instead: After marking the text with your mouse, click the

OUR FAVORITE UTILITIES

Fast-Paste

I'm an impatient cuss, and also something of a DOS holdout. Although I've written about and used Windows since the Clipboard was knee-high to an XT, I still rely on a few cherished DOS programs such as Procomm Plus, Alpha 4, and even Microsoft Word 4.0 for DOS. But this can be a problem: Moving data between windowed DOS applications (or from Windows apps to DOS programs) is a multistep hassle (see Tip 37).

But it doesn't have to be that way. Thanks to Robert Nee's Fast-Paste, you can copy data in a DOS window with a swipe of the mouse and then paste it into another DOS window with a single mouse click.

Just highlight the data, let go of the left button, pop into the target window, and click the right button. No fuss, no muss, no darn menus—and moving data from Windows to DOS applications is almost as easy.

Southpaws can switch the mouse button assignments, or they can configure a third mouse button for one of these tasks. Fast-Paste can be found on PC World Online as PASTE-114.ZIP. • *Fast-Paste $10 (registration fee); Robert F. Nee; 70461,2034 (CompuServe), nee@fininst_10.sbi.com (Internet).* Reader service no. 749

—Robert Luhn

right mouse button once. The text is placed in the Clipboard, ready to be pasted into another application.

38 Closing Windows on DOS Apps. If you run DOS apps in the background, make sure you've unchecked the *Allow Close When Active* option in the advanced section of the application's PIF. If you don't turn this option off, you may shut down Windows while the application is still running, which means it won't have a chance to save its work.

39 Printing Directory Lists From Windows. While File Manager doesn't offer a menu selection for printing a list of files or directories, you can create a DOS batch file to do the job for you. Here's how to set the file up.

Using a text editor such as Notepad, enter the line **DIR %1 > LPT1** (if you wish to print to a printer port other than LPT1, specify that port instead). Save the file to a directory listed in your PATH statement, using **DIRPRINT.BAT** as the file name. In File Manager, choose *Run* from the File menu. At the ensuing prompt, enter **DIRPRINT** *drive:\path*, where *drive:\path* specifies the directory for which you want a printed list.

A DOS screen appears briefly and the batch file runs, sending the directory information to the printer. You then return to File Manager.

40 Testing, Testing. If you are having problems with Windows communications, you should first check and make sure your modem is working under DOS. To do so, shell out to the DOS prompt and type **ECHO ATDT > COM***x*, where *x* is the number of the serial port your modem is connected to. The modem should respond with a dial tone or some other signal to show that it received the command. To shut the dial tone off, type **ECHO ATH0 > COM***x*.

Take It Easy

41 New Mouse Drivers. In addition to letting you adjust the usual mouse attributes, the latest version of Microsoft Mouse software lets you do some things you've never done before.

For example, you can now force the pointer to snap to the default button on any given window—handy if you're tired of moving the mouse halfway across the screen just to click OK. Just select *Mouse* in Control Panel (the icon should reflect the new, ergonomic form of the Microsoft Mouse), then check *Snap-To*.

While you're there, select *Screen Wrap* as well. After you do, whenever you move the mouse past the edge of the screen it will reappear on the opposite edge. While this takes some getting used to, once you do you'll be able to move from the bottom of the screen to the menus at the top with a tiny mouse movement.

DO-IT-YOURSELF DESKTOP #1

The Artistic Approach

"Windows should be easy to navigate and pleasing to the eye. That's why I use utilities."

Lincoln Spector
Associate Editor

1 I'm still searching for the perfect Windows shell. Right now, I'm using PC Tools for Windows. To save screen space, I've turned off its title, menu, and icon bars. I can still access the menus by right-clicking the desktop.

2 This icon calls up my data directory in PC Tools' File Manager—which is vastly preferable to the Windows version.

3 I need two applications—Schedule+ and cc:Mail for Windows—throughout the day. To keep them accessible at all times, I run them minimized up here and open other applications in windows on the left side of the screen.

4 It's a drain on performance, but I don't care—I *like* wallpaper. I switch the wallpaper images from time to time for variety's sake—the one shown is part of the Space Voyages collection created by Don Dixon, from Second Nature Software.

5 I like to have two or three ways to open my most used programs. So I put apps, utilities, and documents I need all the time in PC Tools' Quick Launch, which I can start from any app's control menu or by right-clicking the PC Tools desktop.

6 PC Tools' CrashGuard utility monitors available memory and system resources. Because CrashGuard is always visible, I can shut down apps whenever they start to overload my system.

OUR FAVORITE UTILITIES

Imposter

If you use Windows but long for the quick simplicity of the DOS prompt, you've got to try Darrell Burgan's Imposter, a freeware COMMAND.COM emulator for Windows. When you run Imposter, it looks like a DOS box in a window. But because it's a Windows program, it does things DOS can't. For instance, you can launch a Windows program by typing its name on the command line or by running it from a batch file. You can even launch a program by typing in the name of an associated data file. There's a commercial version of Imposter—Landmark DOS—but I prefer the sleeker freeware version. It's available as IMPOSTER.ZIP on PC World Online and other online services.

—Lincoln Spector

To get the new software, you could simply buy the new mouse. But if you're already the registered owner of a Microsoft mouse, you can order the software separately (it works with existing Microsoft mice). • *Microsoft Mouse software $19.95 plus $5 shipping; Microsoft Corp.; 800/426-9400.*

Reader service no. 750

42 For Lefties Only. Menus in Windows normally drop down to the right of the menu name. If you're left-handed, you may find this alignment awkward. To force the menus to drop down to the left of the menu name, add the line **MenuDropAlignment=1** to the [Windows] section of WIN.INI.

43 Lose the Logo. You may already know that you can open Windows without waiting for the Windows logo to go away, simply by typing **WIN :**. Unfortunately, Microsoft says using the colon can make your system unstable.

But don't worry. You can bypass the Windows logo without giving your system a case of the shakes. At the DOS prompt, type **WIN** followed by a space, press **<F7>** (on screen this will look like WIN ^@), then **<Enter>**. (If you have DOSKEY running, however, this trick won't work: Pressing the <F7> key will just give you a list of your previous DOS commands.)

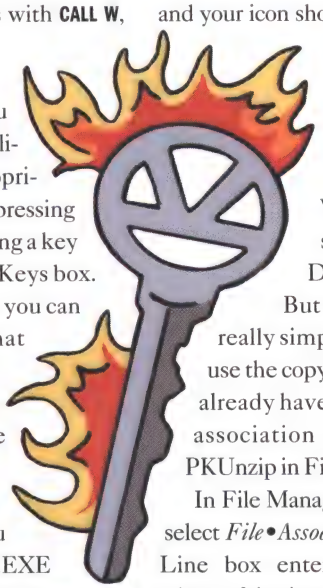
```
NW.BAT
A100
DB "WIN ",0

RCX
5
W
Q
```

If you start Windows from a batch file, you will have to get a little fancy to do it sans logo. Open a text editor and type in the lines at left exactly as written. Note the empty fourth line, and be sure to press **<Enter>** after the 'Q'.

Save the file as **W.DAT**. Exit your editor, and at the DOS prompt type **DEBUG < W.DAT**. This will create a file called W.BAT. Next, copy W.BAT to a directory in your PATH, then open the batch file that you use to start Windows. Replace the command that currently starts Windows with **CALL W**, save the file, and you're done.

44 Hot-Key Madness. You can assign hot keys to applications by selecting the appropriate icon in Program Manager, pressing **<Alt>–<Enter>**, and then assigning a key combination in the Shortcut Keys box. Once the hot key is assigned, you can use it to switch to or open that app. But there's a problem: The hot-key combination opens an app only when you're in Program Manager.



The solution? Give Program Manager its own hot key. You start by dragging PROGMAN.EXE from File Manager into your Program Manager StartUp group. Select the Progman icon, press **<Alt>–<Enter>**, specify a key combination in the Shortcut Key box, and click *OK*. From now on, to open an application quickly, press Program Manager's shortcut key combination, then hot-key from Program Manager to your desired application.

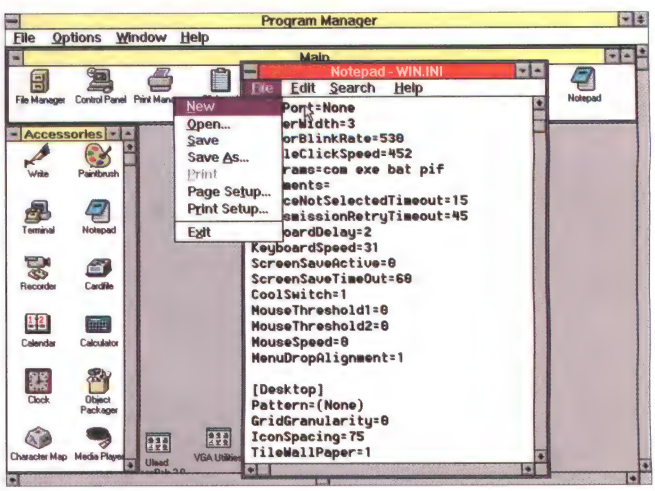
45 Save Power With Blank Screen. Want to extend your monitor's life span *and* save money on energy bills? Set your screen saver to display a blank screen. Keeping the monitor blank gives its phosphors a rest and consumes 10 to 20 watts less than displaying star fields or flying toasters. You'll do your monitor and the environment some good.

46 Control Without Control Panel. Wish you could change your screen colors or add fonts without going to the trouble of opening the Control Panel? You can, by adding one or more Control Panel applets to another program group.

For example, to add the Color icon to another group, start by opening the group. Select *File•New•Program Item•OK*. For a description, enter **Color**. In the Command Line box, enter **CONTROL COLOR**. Click *OK* and your icon should be in place.

47 Easy Unzipping in Windows. If you need to decompress ZIP files when you're in Windows, you could use a specialized utility like Drag And Zip or WinZip. But if you want to keep things really simple, you could instead just use the copy of PKUnzip you probably already have. The trick is to create an association between ZIP files and PKUnzip in File Manager. Here's how.

In File Manager, select a ZIP file. Next, select *File•Associate*, and in the Command Line box enter *drive:\path***PKUNZIP.EXE**, where *drive:\path* specifies the directory containing PKUnzip. Click *OK*. From now on, when you double-click a ZIP file in File Manager, PKUnzip will decompress it.



MAKE MENUS DROP DOWN TO THE LEFT instead of to the right by adding a line to WIN.INI (see Tip 42).

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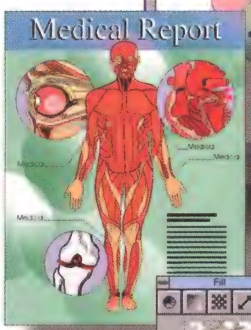

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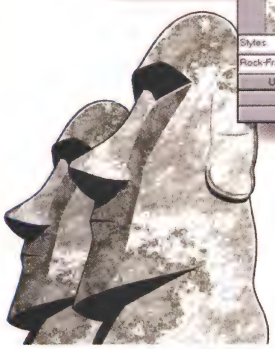

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48 Changing Icon Spacing. If you want to fit more icons on your desktop without changing the screen resolution, you've got two options. First, you could open Control Panel, select *Desktop*, then adjust the spacing value in the Icons section. Unfortunately, this method only allows you to adjust horizontal spacing.

Your second option is a little more complicated, but it lets you adjust both vertical and horizontal spacing. Start by opening WIN.INI in your favorite text editor or SYSEDIT. Go to the [Desktop] section and add one or both of the following lines: **IconSpacing=***x* and **IconVerticalSpacing=***x*. In both cases *x* refers to the number of pixels between icons.

By default, the horizontal spacing is set to 77 pixels; the default vertical spacing changes depending on the font and length of your icon labels. In either case, experiment with different values until you get the spacing you want.

49 Help Bookmarks. Do you use a couple of Help topics over and over? If so, you can access them more easily using bookmarks. To set these up, select *Bookmark • Define* when you're on the topic you want to mark. Name the bookmark at the prompt and click *OK*. Next time you need help on one of these marked topics, just select *Help • Contents • Bookmark* and then pick the name of the Help topic that you want from the list.

50 Annotate Help. You might think that Windows manuals are better than Windows Help screens for one reason: You can scribble notes in the margins of a manual. However, there is an easy way to add your notes to the Windows Help screens.

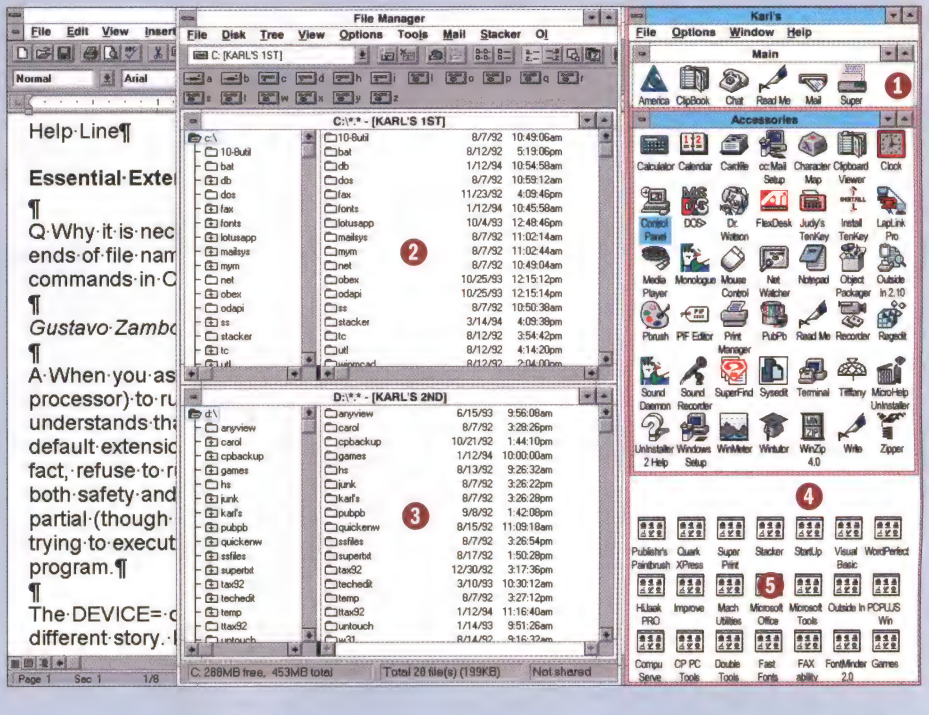
With the topic you want to annotate onscreen, select *Edit • Annotate*. A notepad pops up. Make your notes and click *Save*. A paper clip appears at the top of the Help text. Next time you need your notes, all you need to do is click the paper clip.

51 Color Your World. Windows uses two kinds of hypertext to navigate Help. When you double-click *jump* text, you jump to a related topic. When you double-click *pop-up* text, a small window pops up with a definition of the phrase. Unfortunately, hypertext is, by default, colored green, which is hard to see amid all the black text.

You can change the color of hypertext by editing WIN.INI. To change the color of jump text, add the line **JumpColor=***number,number,number* to the [Windows Help] section. The three numbers are values from 0 to 255, representing levels of red, green, and blue, respectively; **JumpColor=0,0,255**, for example, specifies solid blue. To change the color of pop-up text, add the line **PopupColor=***number,number,number*. The changes should affect the Help screens in all of your Windows applications.

DO-IT-YOURSELF DESKTOP #2

The Pragmatic Approach



"So many applications, so little desktop."

Karl Koessel
Senior Technical Editor

1 I've never bothered to rename any of my program groups. My everyday programs are in StartUp. Other commonly used apps go in Main, and utilities are in Accessories. I try to arrange the icons alphabetically within each group—they're easier to find that way—but I'm not compulsive about it.

2 In addition to using hot keys and double-clicking icons in program groups, I launch applications by double-clicking program or associated data files in File Manager. I try to keep applications on drive C:, data files on drive D:.

3 Another advantage of keeping File Manager open in the center of the screen: I can drag programs and data files into Program Manager on the right or into open apps on the left.

4 The placement of applications in the StartUp program group determines the order in which they load. Schedule+ loads last, so my calendar is on screen when Windows is done loading. cc:Mail loads next-to-last, so once I've checked my appointments and closed my calendar, I see my E-mail in-box.

5 Yes, I have too many groups here, but I need to run lots of applications to do my job. I use 1024 by 768 resolution on my 15-inch monitor just to fit them all on screen. I've reduced the spacing between icons (see Tip 48) and kept their labels short. I wish Windows could create groups inside groups, à la Norton Desktop and other shells.

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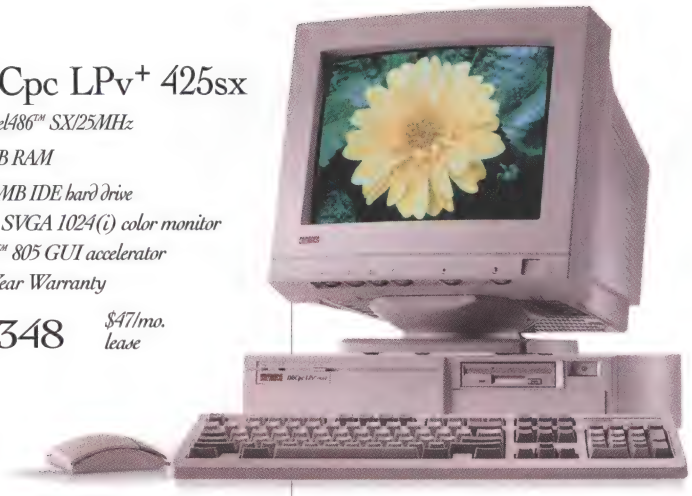

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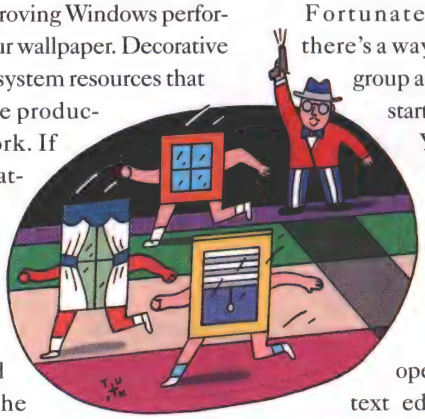
Speedup Secrets

52 Unnaturally Depleted Resources. Are your Windows applications suddenly running slower? Chances are your system resources are low because you've run and exited a number of programs that haven't returned their resources. To assess your resources, save your work and then shut down everything but Program Manager. Select *Help • About Program Manager*. If resources have dipped below 55 percent, exit and reload Windows. Your applications should now have a bit more pep.

53 Just Some Pretty Pictures. If you care about improving Windows performance, get rid of your wallpaper. Decorative BMP files chew up system resources that could be used more productively for other work. If you insist on decorating your desktop, specify a simple pattern for the desktop's background. Go to the Control Panel and select *Desktop*. In the Desktop dialog box, specify *None* under Wallpaper and then select one of the various options under Pattern.

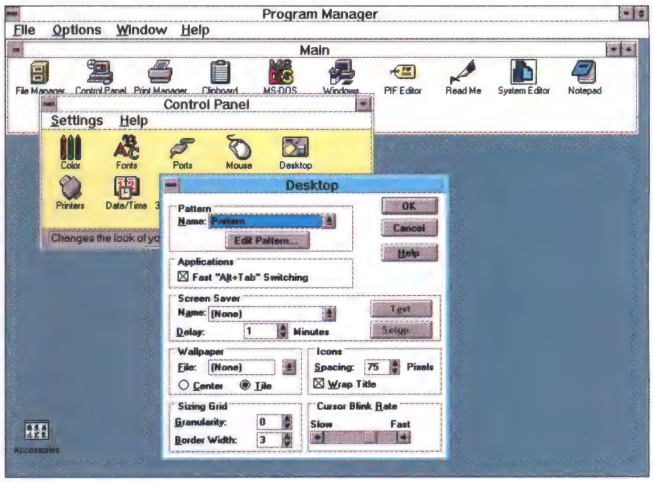


54 Nothing to Lose but Your Pixels. You can improve performance by choosing the lowest screen resolution that meets your computing needs. For example, if you're currently working at 800 by 600, try using 640 by 480 instead. You'll have to rearrange your desktop a bit, but if you can make it work, Windows will be able to run faster.

55 Group Therapy. If you want to make the most of your system's limited resources, then get rid of the StartUp group. You only use it when you start Windows, so it's wasting resources the rest of the time.

Fortunately, there's a way to get rid of the StartUp group and have your favorite apps start when you open Windows. You probably already keep your everyday apps in a single group. All you have to do is tell Windows to use *that* group as your StartUp group.

To make the change, open PROGMAN.INI in a text editor, move down to the [Settings] section, and add the line **StartUp="***group name***"**, where *group name* is the name of any one of your existing program groups. For example, to have the apps in your Main group start when you open Windows, you'd add the line **StartUp="Main"**.



TAKE DOWN YOUR WALLPAPER, speed up your system; if you must have desktop decoration, use a simple pattern instead (see Tip 53).

56 What Size SmartDrive? Although you can specify any cache size you want with SmartDrive, most of the time you should stick with a maximum of 2MB. Few systems benefit from large cache sizes; beyond 2MB, cache performance doesn't increase significantly.

57 Get Smart, Mon. While the default 2MB may be the right SmartDrive cache size for most systems, it may not be right for yours. If you want to find out how big a cache you really need, use the SmartMon utility that comes with DOS 6.0. Select *File • Run* and type **SMARTMON** to bring up the SmartDrive Monitor dialog box. Click the *Control menu* box (▤), select *Always On Top*, then minimize SmartMon.

Now you see a small icon in the lower-left corner of the screen showing the percentage of cache hits (the number of times the operating system found what it was looking for in the SmartDrive cache instead of going to the hard disk). Keep an eye on the icon as you work. If the hit rate is more than 90 percent, you may want to reduce the cache size. If it's less than 80 percent, try making the cache bigger. Otherwise, your existing settings are fine.

58 Pain and Buffering. If you use 32-bit disk access, you can optimize transfers to and from your swap files by adding the statement **PageBuffers=***x* (where *x* is a multiple of 4 from 4 to 32) to the [386Enh] section of SYSTEM.INI. While 32 is a good setting for most systems, experiment with others to find out which is the best one for you.

OUR FAVORITE UTILITIES

Outside In

As an editor, I often receive files from applications I don't own. I also spend an inordinate amount of time browsing through spreadsheets and other documents to check pertinent facts. If I had to install the applications for every file I receive, I'd never get anything done. And even if I did manage to launch all those apps, I doubt that Windows could handle them without crashing. That's why I use Outside In for Windows.

Outside In lets me view virtually any file without launching the associated application. It can show me everything from ASCII text files to complex graphics with the formatting intact. Even better, it lets you copy and paste from viewed files. As a stand-alone utility, Outside In acts as a combination viewer, file manager, and search engine.

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Site Wiring Fault Indicator	YES	NO	YES
Test Button	YES	NO	NO
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LED Status Indicators	YES 4-LED's	NO	YES 4-LED's
Site Wiring Fault Indicator	YES	YES	NO
Test Button	YES	YES	NO
Self Diagnostic Test	YES	NO	NO

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59 Power Management Versus 32-Bit Access. If you're running Windows on a notebook with power management, don't use 32-bit disk access. If you do use it, your system may become confused as to whether the disk is active, rendering power management ineffective and possibly making your system unstable.

60 Swap Files + RAM Disk = Dumb. Some users think putting swap files on a RAM disk will improve performance—after all, if putting a swap file on your hard disk improves performance, putting it on a fast RAM disk should be faster, right? Wrong. A swap file uses part of the hard disk to mimic memory; a RAM disk uses RAM to mimic a hard disk. Assigning a swap file to a RAM disk means you're using memory to mimic a hard disk that's mimicking memory—in other words, you're going around in circles and getting nowhere.

61 Temp Files + RAM Disk = Smart. While putting swap files on a RAM disk is dumb, putting temporary files on a RAM disk is smart (as long as you have at least 8MB of RAM). To create a 2MB RAM drive (the minimum for Windows use), add the line **DEVICE=C:\DOS\RAMDRIVE.SYS 2048 /E** to CONFIG.SYS. The 2048 sets the size of the drive, and the /E switch puts it in extended memory. Next add the lines **MD D:\TEMP** and **SET TEMP=D:\TEMP** to AUTOEXEC.BAT. These lines assume the RAM disk has been created as drive D:. DOS automatically assigns the next available drive letter to your RAM drive. If you already have a drive D: (or E: or F:), set your temp directory accordingly.

62 Improve Your Communications Skills I. If you find that your communications program is running slower than usual, add **FasterModeSwitch=1** on its own line in the [standard] section of SYSTEM.INI.

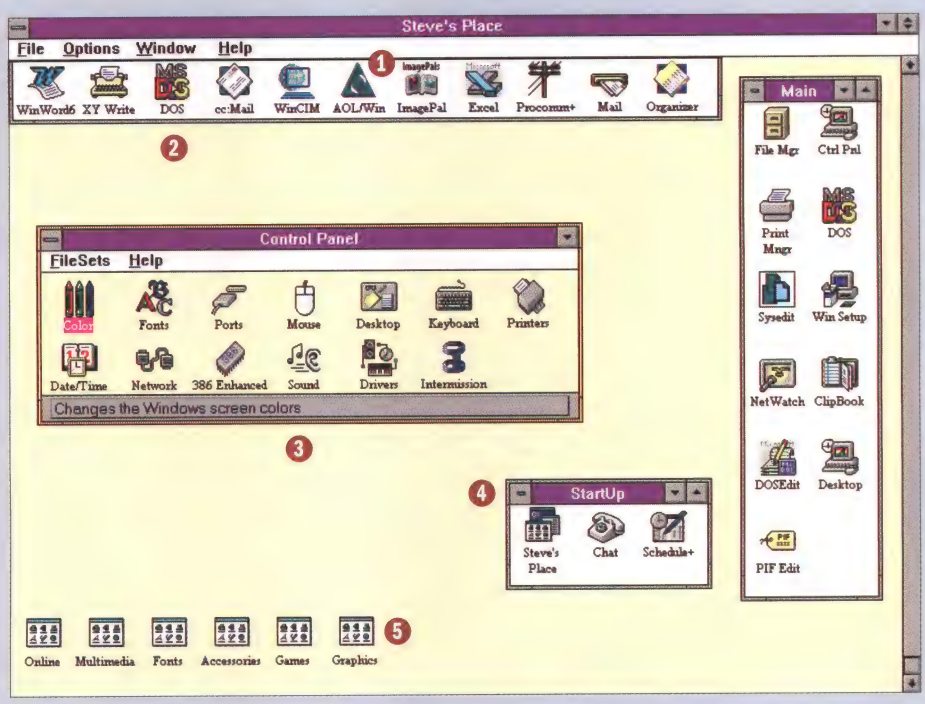
63 Improve Your Communications Skills II. If you're running a DOS communications program under Windows, you may not get the performance you'd expect. Windows allocates system resources to several apps at a time, but DOS communications programs assume they have exclusive use of those resources all the time. Here are a few ways to improve communications:

- Be sure you're running your DOS communications application at full screen.
- If you're running your DOS application in the background (as you would during a data transfer, for example), run the app minimized as an icon rather than in a window.
- If you have a permanent swap file and 32-bit disk access enabled, open the application's PIF file with the PIF Editor, select *Advanced Options*, and check the *Lock Application Memory* option.

64 Make Your Work Group Faster. Systems that are connected with Windows for Workgroups 3.11 sometimes run a little slower than they should. This is because Workgroups periodically polls connected systems, and when it does, your system must pause.

DO-IT-YOURSELF DESKTOP #3

The Neat Approach



"My office is a mess, but my Windows desktop is clean and lean."

Steve Fox
Senior Editor

1 My everyday apps are in a single program group that masquerades as a tool bar. First I sized the window so the icons fit into a single row, then I pushed the group up to the top of the screen until its title bar disappeared.

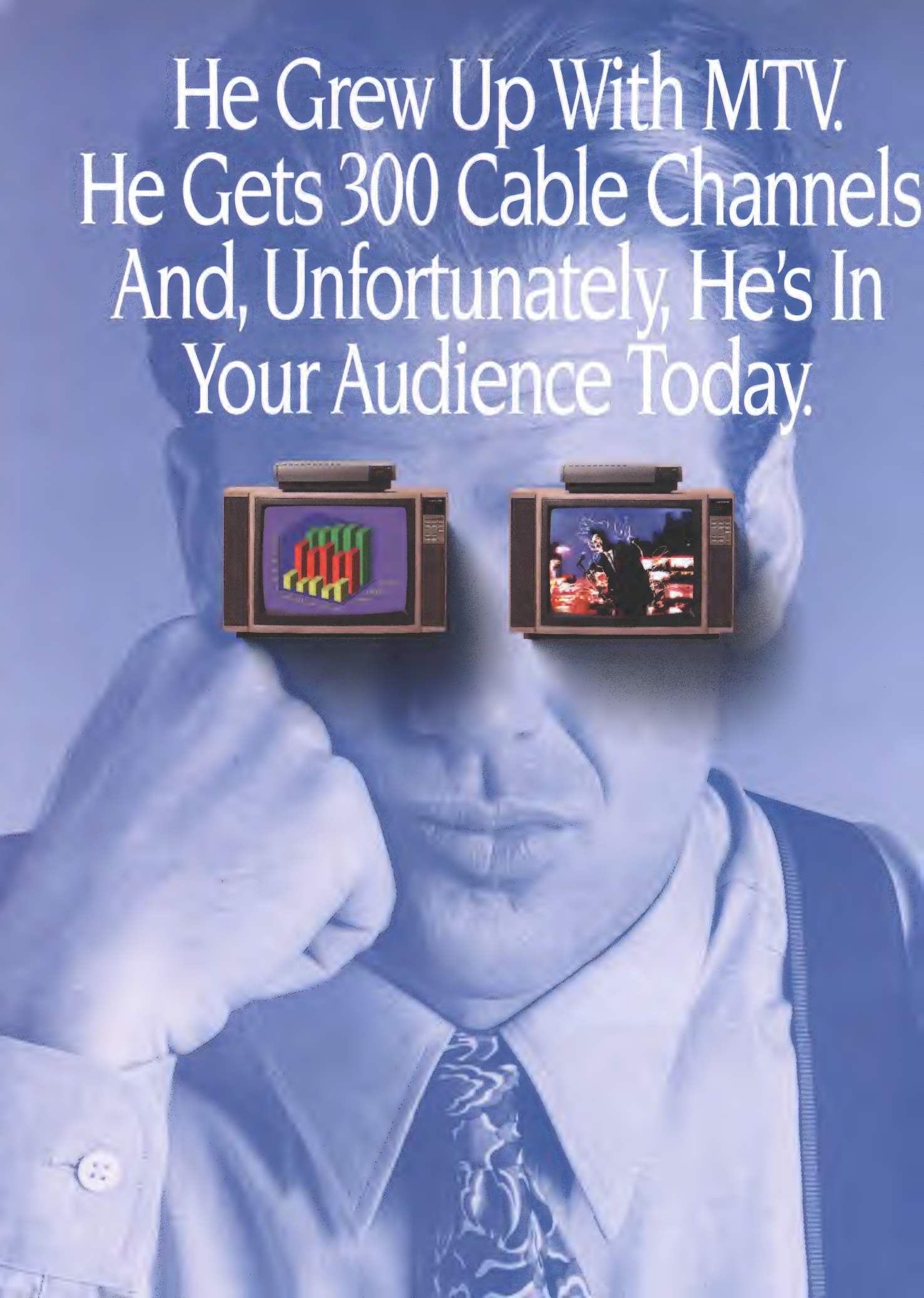
2 I've also reduced the spacing between icons (see Tip 48) and shortened their labels. Thus, 'MS-DOS Prompt' becomes 'DOS' and 'Print Manager' becomes 'Print Mngr'.

3 I've streamlined Control Panel by getting rid of modules I never use, such as MIDI Mapper and International (see Tip 8). And note that I've changed the menu title from the default, Settings, to FileSets, by editing CONTROL.EXE. That way, I can use the same keyboard combination—<Alt>–FX—to close Control Panel that I use to close my other applications.

4 I keep Program Manager in my StartUp group. That allows me to rename it Steve's Place. It also means I can assign a hotkey to it (see Tip 44).

5 In addition to my everyday tool bar group (top of the screen), Main, and StartUp, I have six other groups—a total of nine, the maximum number of groups Program Manager will display under the Window menu.

He Grew Up With MTV. He Gets 300 Cable Channels And, Unfortunately, He's In Your Audience Today.



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Circle 192 on reader service card

The Last DOS Tips You'll Ever Need

65 Want to format a floppy disk quickly, without wading through a series of prompts? If you're sure that the disk doesn't hold any data you need, put the disk in the drive and enter the line `FORMAT A: /AUTOTEST /U`. If the floppy has been formatted previously, add `/Q` for even quicker formatting. If you have another disk to format as well, just put it in the drive and press <F3> and then <Enter>.

66 Adding `/P` to a DEL command—`DEL *.BAK /P`, for example—produces a prompt that asks you to confirm the deletion of each one of the files. If you always want this confirmation request, you can make it the default by adding the line `DOSKEY DEL=DEL $1 /P` to your AUTOEXEC. BAT file.

67 Can't find a file? Add the line `DOSKEY FF=DIR \$1 /P /A /S /B` to AUTOEXEC-.BAT. After you restart your system, you can find a file by typing FF followed by a space and the file spec you want to search for. DOS will find all the matching files, wherever they may be.

68 You can change the way DIR displays files by using switches. The handiest of these is `/O`, which specifies the order in which files are sorted. Type `DIR /O:D`, for example, to display files sorted by date. Use the command `HELP DIR` for other DIR switches. You can put a minus sign in front of any sort key to sort files in descending, rather than ascending, order.

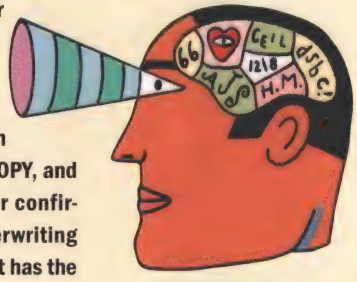
To change permanently the way DIR displays directories, set the DIRCMD environment variable. For example, to make DIR display files sorted by date instead of name, add the line `SET DIRCMD=/O:D` to your AUTOEXEC.BAT file.

69 Normally the DIR command will not show you hidden or system files. To see a listing of all files, type `DIR /A`. To find hidden files only, type `DIR /AH`; for system files only, use `DIR /AS`.

70 Starting with DOS 6.2, MOVE, COPY, and XCOPY ask you for confirmation before overwriting an existing file that has the same name. However, you don't get the confirmation prompt if you put these commands in a batch file.

You can force DOS to ask you to confirm overwrites by adding `SET COPYCMD=/-Y` to AUTOEXEC.BAT. To turn off all prompts, add the line `SET COPYCMD=/Y`.

71 If you want to make your batch files (including AUTOEXEC.BAT) run a little faster, use a double colon instead of REM to remark out individual lines you don't want to run. The reason is that DOS reads REM as a command, so it has to process each remarked line. DOS treats lines beginning with colons as labels, which it doesn't have to process. And since real labels can't begin with colons, DOS won't confuse the double-colon lines for a real label.



As long as you're connected to other systems, there isn't a lot you can do about this. But when you don't need the networking capabilities, you can get a speed boost by telling Workgroups not to hook up with the other systems in your work group. To do this, exit and restart Windows. But instead of typing the usual WIN command, type **WIN /N**, then press <Enter>. Windows will start up without attaching to the network. When you want to reconnect to the work group, exit Windows again and use the standard WIN command.

Troubleshooting Tricks

72 **Help on the Way.** Need help? Microsoft has a gigantic customer support infrastructure. But if calling customer support lines and waiting on hold doesn't appeal to you, check out Microsoft's online help. To do so, dial up the Microsoft Download Service (206/936-6735). From there you can download all kinds of documents, from answers for the most commonly asked Windows and DOS questions to technical treatises on Windows programming. If you have a CompuServe account, look into the large Microsoft forum by typing **GO MICROSOFT**. For AOL users, the keyword is **MICROSOFT**.

73 **Clean Off Your Boots.** A clean boot is an essential first step in troubleshooting any serious system problem. But what *is* a clean boot? On a Windows system, a clean boot means your CONFIG.SYS reads:

```
FILES=45
BUFFERS=20
DEVICE=C:\path\HIMEM.SYS
DEVICE=Disk partitioner, disk compression driver, or other third-party drivers
STACKS=9,256
SHELL=C:\COMMAND.COM /E:1024/P
```

If you have lines in your CONFIG.SYS beyond this bare minimum, remark them out (deactivate them) by typing **REM** followed by a space at the beginning of the line. If you don't know what a given device driver or program does, don't remark it out until you find out by rebooting your system—most device drivers and programs announce what they do during boot-up.

A clean-booting AUTOEXEC.BAT file should consist of nothing more than:

```
PROMPT $P$G
PATH=C:\WINDOWS;C:\DOS;C:\
SET TEMP=C:\TEMP
```

Clean start-up files should *not* contain memory managers, including EMM386-.EXE; the command DOS=HIGH,UMB; software disk caches, including SmartDrive; the JOIN, GRAPHICS, PRINT, SUBST, or APPEND commands; RAM disk devices; drivers for networks, CD ROM drives, scanners, or faxes; DOS mouse drivers; or virus checkers.

74 **Stepping Through Your Boot.** Once you have your system running from a clean boot, you can apply a second classic troubleshooting technique. Line by line, remove the REMs from CONFIG.SYS and then from AUTOEXEC.BAT. Each time you remove one, reboot the system. If your system boots okay, go on to the next line. If your system hangs, the last line you reactivated is the culprit.

If you're using DOS 6.0 or a later version, there's an even easier way to step through your boot sequence. Remove the REMs from your clean start-up files and reboot. When you see the words 'Starting MS-DOS', press <F8>. If you have MS-DOS

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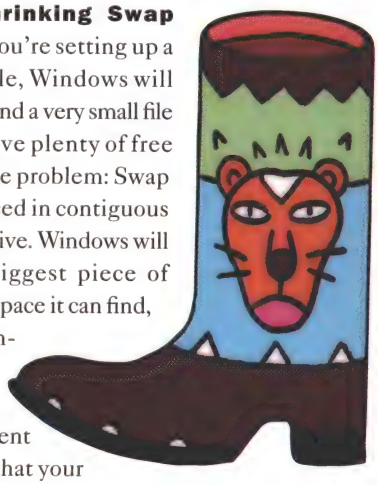
Circle 114 on reader service card

version 6.0, <F8> causes CONFIG.SYS to execute one line at a time (making it easy to identify the bad lines) and then gives you the option of not running AUTOEXEC.BAT. With MS-DOS version 6.2, pressing <F8> during the boot will make both CONFIG.SYS and AUTOEXEC.BAT run one line at a time.

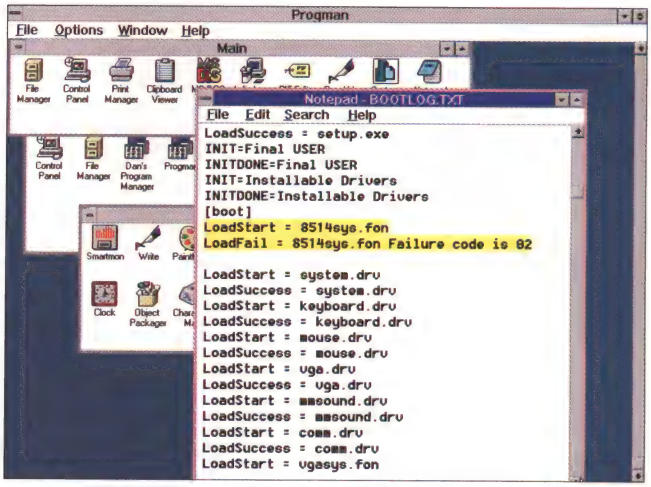
75 Logging Your Boot. If you're having trouble getting Windows to run, it may help to start Windows by typing **WIN /B**. The /B switch creates a file, BOOTLOG.TXT, in your \WINDOWS directory, which will show you what's loading properly and what isn't when you start Windows. After you boot, open BOOTLOG.TXT in a text editor and look for the phrase 'LoadFail='. It will be followed by the names of Windows components that didn't load properly.

76 Amazing Shrinking Swap Files. When you're setting up a permanent swap file, Windows will sometimes recommend a very small file size, even if you have plenty of free hard disk space. The problem: Swap files need to be placed in contiguous sectors of the hard drive. Windows will recommend the biggest piece of unfragmented disk space it can find, but no more. If Windows is recommending a ridiculously small permanent swap file, it may be that your hard disk is fragmented.



If that's the case, use a disk optimizer such as DOS 6.*x*'s Defrag, Speed Disk by Norton Utilities, or Compress by PC Tools to free up more contiguous space. After the defrag, try setting up the swap file again—Windows should recommend a much larger size.

77 Amazing Disappearing Swap Files. Have you set up a swap file only to find that the amount of RAM your system reports hasn't increased at all? If this is the case, you should check the [386Enh] section of your SYSTEM.INI file for the line 'Paging=Off'. If you find it, insert a semicolon at the beginning of the line to remark it out, then restart Windows. Windows should now tell you the correct amount of memory.



CREATE A LOG OF YOUR BOOT SEQUENCE to troubleshoot problems; just start Windows by typing WIN /B (see Tip 75).

78 Sneaky Swap File Settings. Windows sometimes changes the size and type of your swap file when you change the 32-bit disk access setting in the Control Panel. To prevent this, change the 32-bit disk access setting in SYSTEM.INI instead of in the Control Panel. Just open SYSTEM.INI in a text editor (or by using SYSEDIT.EXE) and change the line reading '32BitDiskAccess=' in the [386ENH] section. When you're finished, restart Windows to put your changes into effect.

79 Deleting Forgotten Passwords. What should you do if you forget the password for your Windows 3.1 screen saver, leaving you locked out of Windows? Kicking and screaming is always an option, but the only productive alternative is to turn off and then turn back on your computer, restart Windows, open CONTROL.INI in a text editor, find the [ScreenSaver] section, and delete the line starting 'Password='.

80 Save Your Setup. Before you install a new application or make any major change to your Windows setup, copy the INI, DAT, and GRP files from the Windows directory to a floppy or another directory on your hard drive. If the new application messes up your system, you can restore the old setup by copying these saved files back into your Windows directory.

Dan Miller is an assistant editor for PC World. *Contributors include: Microsoft Corporation; the Windows User Group; Danny L. Clark, Mark J. Dorfman, Don Mars, and Jeff Yablon (via America Online); Fredrick Lovret (via CompuServe); Steve Bass, George Campbell, Brett Glass, Judy Heim, Robert Luhn, and Daniel Tynan (contributing editors,* PC World*); Michael Desmond (assistant editor,* PC World*); Steve Fox (senior editor,* PC World*); Karl Koessel (senior technical editor,* PC World*); Lincoln Spector (associate editor,* PC World*). Special thanks to Ken Johnson (director, Chicago Computer Society) for his DOS tips.*

OUR FAVORITE UTILITIES

The UnInstaller

As a computer columnist, I use and test zillions of Windows applications. But installing lots of programs has an unfortunate side effect: Too many programs take it for granted that when I install them I'm giving them free rein to edit my WIN.INI and SYSTEM.INI files, to stuff my Windows directory with new DLLs, and to generally make a mess of my system. Even worse, few of them have the manners to tell me what they're doing.

The best way I've found to untangle this mess is a utility called The UnInstaller, from MicroHelp. It's an amazingly good detective and can identify the files that are associated with existing applications as well as orphaned files from programs long ago deleted. And The UnInstaller is polite, too: To prevent mishaps, it asks me before it does anything, and it can undo its modifications if they seem to have caused a malfunction. • *The UnInstaller $59.95; MicroHelp, Inc.; 800/922-3383.*

Reader service no. 752

—Brett Glass

When all else fails,

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There are three types of computer users: those who have lost data due to a power problem, those who are going to, and those who have protected themselves against the inevitable surge, blackout or brownout with the most reliable UPS they can buy: Back-UPS by APC. In fact, editors and users alike agree that if your system demands absolute reliability, you can depend on APC Back-UPS.

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PC MAGAZINE UK EDITORS' CHOICE

"The clear winner in price performance...it's unbeatable..."

August 1993
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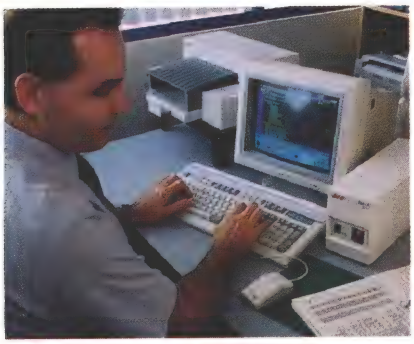

"All other brands of UPS die regularly in this lightning prone environment. My APC won't die!" said Paul Sisilli, Systems Analyst, City of Port St. Lucie . "With other brands, users don't find out until it is too late. The power interruptions here are very hard to live with. The other brands are dying off. Typically they last just beyond their warranty period. My Back-UPS is going on three years...no other brand is as reliable."

Don Traux knows first hand about Back-UPS reliability: "It ought to be against the law to buy a computer without an APC Back-UPS 250. I recently had a direct lightning hit right outside the house...my computer never blinked. Each morning I get a surge down the line and both APC's hate it - they simultaneously 'holler 'n clamp' while my 'Brand T' quietly sleeps in. I've relegated that unit to non-critical household stuff like my VCR."

Andrew Wargo, Manager at Baxter Land Company, tried two other brands before Back-UPS. "One lasted a few days, a second one went up in smoke after 48 hours, a third lasted less than 24 hours! I then bought my Back-UPS for less than half of what I had paid for the others. We've purchased three more Back-UPS and for the past 14 months they've been just hummin' away on the same power line that was eating the other brands alive!"

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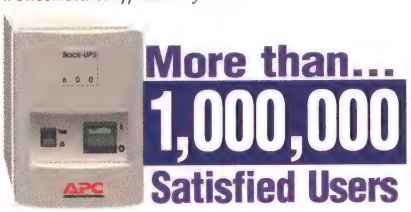

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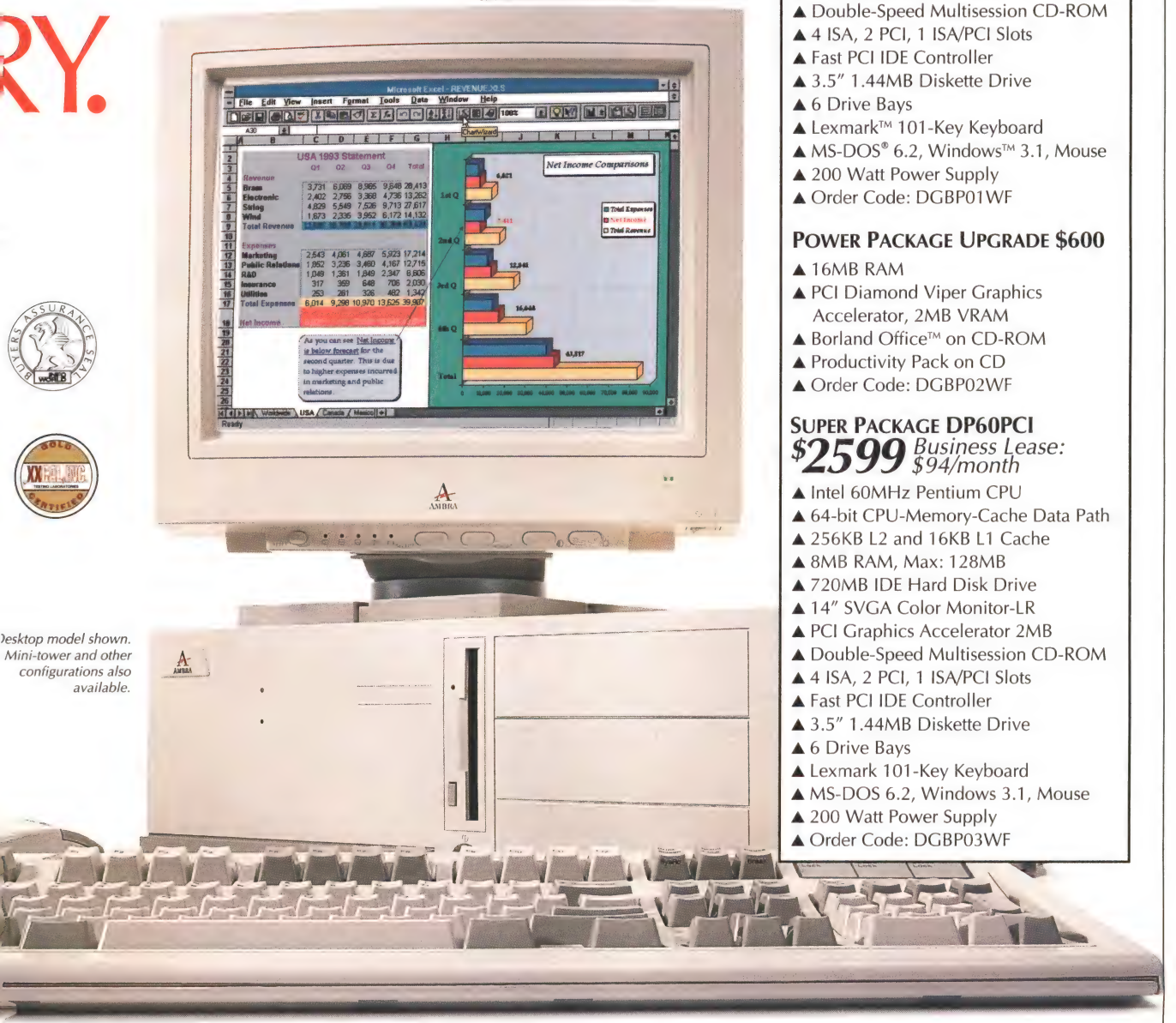

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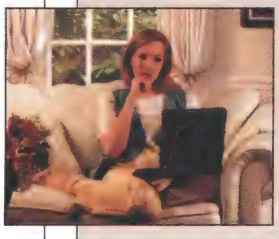

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- ▲ 3.5" 1.44MB Diskette Drive
- ▲ 1 Type III PCMCIA Slot
- ▲ 86-Key Keyboard
- ▲ Integrated 16mm Trackball
- ▲ MS-DOS 6.2, Windows 3.1
- ▲ Carrying Case
- ▲ 6.6 pounds, including battery

486SX/33MHz

$1999 *Notebook Model N433C-120*

Business Lease: $73/month

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- ▲ 3.5" 1.44MB Diskette Drive
- ▲ 1 PCMCIA Slot Type III
- ▲ 86-Key Keyboard
- ▲ Integrated 16mm Trackball
- ▲ MS DOS 6.2, Windows 3.1
- ▲ Carrying Case
- ▲ 6.6 pounds, including battery

Subnotebook Accessories

Road Warrior: $376

- ▲ PCMCIA 2.4/9.6 kbps Data/Fax Modem, Carrying Case
- ▲ Extra Battery, Battery Charger

Quick Dock: $404

- ▲ Port Replicator, Keyboard
- ▲ 14" SVGA Color Monitor

Notebook Accessories

Instant Office: $927

- ▲ Docking Station, Keyboard
- ▲ 15" FST-NI Color Monitor

Traveler: $278

- ▲ PCMCIA 2.4/9.6 kbps Data/Fax Modem, Extra Battery

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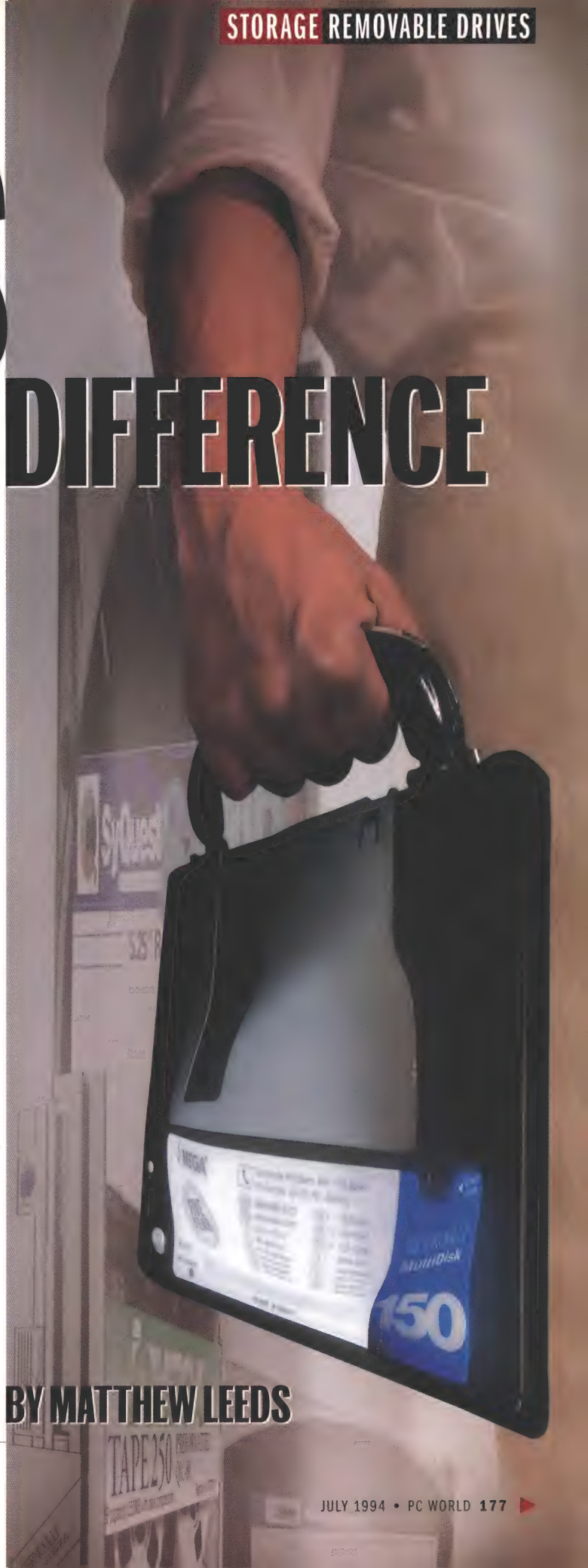
DRIVES WITH A DIFFERENCE

Searching for the incredible expanding hard disk? These 15 removable media drives—from floptical to optical—pack 88MB to 256MB on a single disk or cartridge.



GILES HANCOCK

BY MATTHEW LEEDS

Conventional hard drives are cheaper, better, and bigger than ever. With that in mind, it seems incongruous to say you can't buy a big enough hard disk. But data from desktop publishing and multimedia applications, scanners, and video capture cards, for example, all take massive bites out of disk space—especially if you have to keep multiple versions of each file. You can quickly accumulate enough data to eat up every megabyte on even a jumbo hard drive. Add the need to transport humongous chunks of data, such as image files, and you face a dilemma no conventional hard drive or floppy disk can resolve.

Fortunately, removable media drives can satisfy your applications' appetite for disk space and fulfill your need for transportability. When you run out of storage space on a conventional hard drive, you're stuck between a rock and a hard disk; your only option is to remove some of the data from the drive. With a removable media device, you just pop out the full disk or cartridge and insert an empty one. In addition, you can also exchange media between drives of the same type. Want to move a 50MB PageMaker file to a service bureau? Just copy it to a cartridge and courier it over—no need to deal with compressing it and breaking it up into floppy disk–size files. Most service bureaus have at least one type of removable media drive, and if you're ready to provide enough business, you can get many bureaus to buy the type you want to use.

TESTING BY SUSAN SILVIUS; RESEARCH AND SUPPORT BY JOHN GODDARD AND CAROLINE JONES

Who You Gonna Call?

But what kind of removable media drive is most practical? Choices run from 21MB floptical drives all the way up to 5¼-inch rewritable optical drives with gargantuan capacities exceeding 1GB per disk. But each of these choices has its downside: The former lacks the capacity and performance to stand up to heavyweight apps, and the latter is generally high-priced overkill for any but the most demanding jobs.

With removable media drives, the more media you use, the lower your cost per megabyte (see "Increasing Storage Means Decreasing Cost per Megabyte"). Affordable models are priced from less than $500 to $1500 or so on the street and provide capacities from under 100MB to well over 200MB per cartridge or disk. That's enough storage to handle most desktop publishing jobs or to transport typical image files to a service bureau. Media selling prices run from around $36 to $112 each; all drives included one disk or cartridge.

We looked at magnetic and magneto-optical (MO) removables, putting together the information you need to compare their performance and cost. In addition, we call your attention to the drives that stand out—in a positive or negative way—in usability and ease of installation.

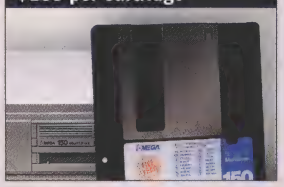
Removable media has additional advantages aside from its data-exchange capabilities and limitless storage expandability. For data security, you can remove the media from a drive and lock it up off-site. You can also use the media to distribute data within organizations that either lack a network or use a LAN that can't support transfers of

Increasing Storage Means Decreasing Cost per Megabyte

With removable media drives, cost per megabyte is highest for the drive with just one piece of media. The floppy drive provides a compelling example: With one 1.44MB floppy, you pay almost $35 per megabyte! But factor in the cost and capacity of 100 floppies, and the cost is a reasonable $1 per megabyte. Of the products reviewed, the Iomega Bernoulli and 128MB MO drives become highly cost-effective as you purchase enough media to approach 3GB of total storage: At about 80¢ per megabyte, they are actually a bit cheaper than conventional hard drives. The greater capacity of the 230MB MO's disks makes it the best value for high-volume mass storage, while a cost per megabyte of approximately 30¢ with 20 tapes makes the QIC-80 tape drive the clear winner for offline archiving and backup.

Iomega Bernoulli

$103 per cartridge



PROS: Low drive cost; very good performance; full compatibility with 35MB, 70MB, 90MB, 105MB, and 150MB media; shock-resistant media; widely used. Good for infrequently used programs and data, DTP files, data exchange, data security.

CONS: Relatively high media cost; 5¼-inch form factor.

	Capacity	Cost	Cost per MB
Drive with 1 cartridge	150MB	$479	$3.19
Drive with 5 cartridges	750MB	$891	$1.19
Drive with 10 cartridges	1500MB	$1406	$0.94
Drive with 20 cartridges	3000MB	$2436	$0.81

SyDOS 88e extra

$112 per cartridge

PROS: Low drive cost; good performance; read-compatibility with 44MB media; most popular drive with service bureaus. Good for infrequently used programs and data, DTP and graphics files, data exchange, data security.

CONS: Relatively high media cost; 5¼-inch form factor; most fragile media of the products reviewed.

	Capacity	Cost	Cost per MB
Drive with 1 cartridge	88MB	$500	$5.68
Drive with 5 cartridges	440MB	$948	$2.15
Drive with 10 cartridges	792MB	$1508	$1.90
Drive with 20 cartridges	1672MB	$2628	$1.57

SyDOS Marlin 105i

$69 per cartridge

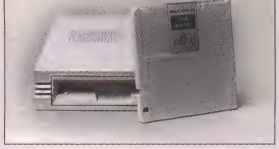
PROS: Low drive cost; very good performance; higher capacity and lower media cost than SyDOS 88e extra; 3½-inch form factor. Good for infrequently used programs and data, DTP and graphics files, data exchange, data security.

CONS: Most fragile media of the products reviewed.

	Capacity	Cost	Cost per MB
Drive with 1 cartridge	105MB	$569	$5.42
Drive with 5 cartridges	525MB	$845	$1.61
Drive with 10 cartridges	1050MB	$1190	$1.13
Drive with 20 cartridges	2100MB	$1880	$0.90

MO 128

$50 per disk



PROS: Durable, light, compact media; long media life; 3½-inch form factor; relatively inexpensive media. Good for long-term storage, infrequently used programs and data, large DTP and other graphics files, data exchange.

CONS: High drive cost; performance just fair.

	Capacity	Cost	Cost per MB
Drive with 1 disk	128MB	$1189	$9.29
Drive with 5 disks	640MB	$1389	$2.17
Drive with 10 disks	1280MB	$1639	$1.28
Drive with 20 disks	2560MB	$2139	$0.84

large files. In a pinch, removable media drives can also serve as a second or replacement hard drive, although parallel port models won't work as boot disks unless you hook them up via a SCSI adapter.

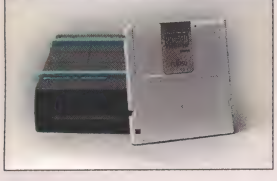
While these removable media products can—and often are—used for backups, tape drives and media are much less expensive. When you need quick access to data or programs you've archived, removable media devices really shine; you can run programs from the archival drive, which you can't do with tape backup. A floptical disk looks just like a 1.44MB floppy but can hold 21MB of data. Floptical drives (which are SCSI devices) are handy for data transfers and backups—as long as the files aren't overly large. But floptical drives lack the capacity for handling jumbo graphics files or full backups. Despite having been on the market for years, flopticals haven't really caught on as floppy drive replacements, even though they're compatible with 720K and 1.44MB floppies. This is because flopticals commonly sell for $300 to $400, with disks costing about $20. A number of companies sell PC-compatible floptical drives, including Iomega, PLI, and the original developer, Insite Peripherals (408/441-0660).

A Removable for All Seasons

Each of these drive types works differently and uses media with different characteristics and advantages. Iomega's Bernoulli drives spin flexible media within a cartridge, using flowing air to stiffen it except where it bubbles up toward the read/write head. Because the head can't contact the media—even under extreme shock—these drives

Pinnacle Micro Tahoe 230

$69 per disk



PROS: Durable, light, compact; high capacity; long media life; good performance; 3½-inch form factor; inexpensive media cost per megabyte. Good for long-term storage, DTP and graphics files, infrequently used data and programs, data exchange.

CONS: High drive cost.

	Capacity	Cost	Cost per MB
Drive with 1 disk	230MB	$1199	$5.21
Drive with 5 disks	1150MB	$1475	$1.28
Drive with 10 disks	2300MB	$1820	$0.79
Drive with 20 disks	4600MB	$2510	$0.55

Floptical

$20 per disk

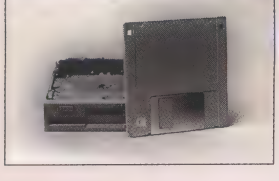
PROS: Compatible with standard 720K and 1.44MB floppies; 21MB capacity on compact, floppylike media; 3½-inch form factor. Good for transporting files over 1.44MB and under 21MB in size and for relatively small backups.

CONS: Relatively high drive cost and limited disk capacity; poor performance; fairly high cost per megabyte unless you use a lot of media.

	Capacity	Cost	Cost per MB
Drive with 1 disk	21MB	$400	$19.05
Drive with 5 disks	105MB	$480	$4.57
Drive with 10 disks	210MB	$580	$2.76
Drive with 20 disks	420MB	$780	$1.86

Floppy disk

$1 per disk



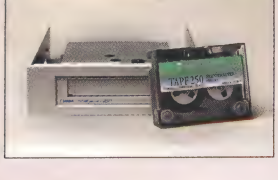
PROS: Low drive cost; highly compatible for data exchange, with drives available in almost all current systems; compact, highly portable media. Good for data exchange of small files, software distribution, and very small backups.

CONS: Very poor performance; limited capacity; drive and media reliability lower than that of other removable media devices.

	Capacity	Cost	Cost per MB
Drive with 1 disk	1.44MB	$50	$34.72
Drive with 10 disks	14.4MB	$59	$4.10
Drive with 20 disks	28.8MB	$69	$2.40
Drive with 100 disks	144MB	$149	$1.03

120MB QIC-80

$25 per tape

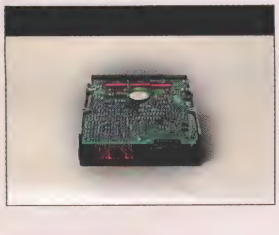


PROS: Inexpensive drive and media; good media capacity and reliability; great cost per megabyte. Good for backups; generally accepts 200MB to 250MB of data on a single tape.

CONS: Useful only for backups; programs and data must be restored before you can access them.

	Capacity	Cost	Cost per MB
Drive with 1 tape	120MB	$200	$1.67
Drive with 5 tapes	600MB	$300	$0.50
Drive with 10 tapes	1200MB	$425	$0.35
Drive with 20 tapes	2400MB	$675	$0.28

Hard drive



PROS: Highest-performance storage device; highly reliable, with very large capacities available. Good for data and program storage and for launching and running programs.

CONS: Nonremovable media.

	Capacity	Cost	Cost per MB
Drive	210MB	$210	$1.00
Drive	540MB	$540	$1.00
Drive	1050MB	$900	$0.86
Drive	2100MB	$1800	$0.86

can operate under adverse conditions. Head crashes are unheard of, and the cartridges are far more likely to survive being dropped than are the SyDOS drives' media.

SyDOS, owned by SyQuest, configures SyQuest drives and sells them to PC users. (As we were going to press, SyQuest [800/245-2278] announced it will be marketing its 105MB drives directly; SyDOS will continue to market just the 88MB drives.) The SyQuest media used by these drives uses the same kind of rigid platter found in conventional hard drives. The disk is protected by a shutter that opens once a cartridge is inserted in the drive. With proper handling, the SyDOS media can be carried or mailed safely—as evidenced by its high popularity with publishing service bureaus—but it can't compare with Bernoulli cartridges in terms of shock resistance.

A number of vendors sell versions of both the SyQuest- and the Iomega-manufactured drives. We looked only at the Iomega and SyDOS products for the purposes of this article, but you can also comparison-shop for these products from companies such as Liberty Systems and PLI.

MO drives use a combination of traditional magnetic and laser technology to read and record data. Unlike the Bernoulli and SyDOS products, the encoding on an MO disk is virtually immune to accidental magnetic alteration—a big consideration if you're using your removable drive for security and archiving. In operation, an MO drive's read/write heads stay well away from the media, rendering head crashes almost impossible. And MO media is both highly durable and eminently portable.

Sizing Up Drive Installation and Operation

These drives come in a variety of configurations: The drives from Fujitsu, Pinnacle Micro, and Liberty are remarkably small. At the other end of the spectrum, the Valitek's case is a monster. The Liberty and Valitek drives have a parallel-to-SCSI interface but can also use a conventional SCSI adapter.

Generally, it's a good idea to buy an internal unit, as long as your computer has an externally accessible bay that will accommodate the drive—internals are less expensive. Among the magnetic drives, only the SyDOS Marlin 105i fits a standard 3½-inch bay, as will most internal versions of 3½-inch MO drives. (Ask the vendor to make sure.) Internal versions of any of these drives fit standard 5¼-inch bays, at least if you have the right adapter rails. If you don't have a free bay or if you need portability, buy an external model. Among these types of units, the 128MB Liberty 50MOP and the Valitek PST2-MO128 drives offer the best portability, allowing you to install the drive by simply plugging it into the parallel interface on any PC (although Valitek provided a SCSI interface for our tests).

Installing most of the drives included here is usually a painless procedure, taking a half hour or less if you follow the directions. Of course, installation may not be so easy if the vendor provides inadequate documentation or utilities don't work as expected. For example, we struggled with Valitek's installation instructions, although our tests went fine once we installed the drive.

Iomega scores big points for good documentation and ease of installation. For example, it's a snap to install the Bernoulli Insider IDE drive as a slave unit to an existing IDE drive. The company includes a

FEATURES COMPARISON

At 256MB per Disk, Ocean Is Still the Capacity Leader

● Yes
○ No
n/a = not applicable

	MAGNETIC REMOVABLE MEDIA DRIVES					MAGNETO-OPTICAL DRIVES		
	Iomega Bernoulli MultiDisk 150 Transportable	Iomega Bernoulli MultiDisk Insider 150 IDE	SyDOS 88e extra	SyDOS Marlin 105e	SyDOS Marlin 105i	Fujitsu Dynamo 128	Liberty 50MOP	Ocean Vista V256
Selling price of drive/media as of 4/1/94[1]	$579/$103	$479/$103	$500/$112	$629/$69	$569/$69	$1300[2]/$50	$1149/$39	$999/$79
Unformatted capacity (MB)	150	150	88	105	105	128	128	256
Interface type	SCSI	IDE	SCSI	SCSI	IDE	SCSI	parallel/SCSI	SCSI
Drive manufacturer and model	Iomega B150	Iomega B150IDE	SyQuest SQ88e	SyQuest SQ3105	SyQuest SQ3105AT	Fujitsu M2511A	Fujitsu M2511A	MOST RMS256E
Average seek/latency time (ms)	18/12.7	18/12.7	20/9.3	14.5/8.3	14.5/8.3	30/8.3	30/8.3	35/12.5
Mean time between failures (hours)	200,000	200,000	80,000	100,000	100,000	30,000	30,000	30,000
Buffer size (K)	256	256	32	64	64	256	256	128
Drive type	external[3]	internal[4]	external[3]	external[3]	internal[5]	external	external parallel	external[3]
Driver type	proprietary	proprietary	proprietary	proprietary	proprietary	EZ-SCSI ASPI	SCSI-Works ASPI	Corel SCSI
Power indicator	●	n/a	●	●	n/a	○	●	●
Warranty (years)	2	2	2	2	2	1	1	1
Toll-free support	●	●	●	●	●	○	○	●
Contact	800/777-6179, 801/778-1000	800/777-6179, 801/778-1000	800/437-9367, 407/998-5400	800/437-9367, 407/998-5400	800/437-9367, 407/998-5400	800/626-4686, 408/432-6333	408/983-1127	800/944-6232, 714/898-1340
Reader service number	755	756	757	758	759	760	761	762

[1] All prices are direct or vendor-estimated street prices. Drive prices include adapter, cables, and drivers. [2] List price. [3] Internal version available. [4] Fits standard 3½-inch externally accessible drive bay.

utility that checks your IDE hard drive and displays the necessary jumper changes to make it compatible with the Iomega drive.

Putting the Drives to the Test

We ran four tests on each drive (see the Test Report). In the Data transfer test, the Iomega and SyDOS drives were by far the fastest. The capacious new 230MB Pinnacle Micro Tahoe 230 was the quickest MO drive, but it lagged behind the SCSI Iomega leader by a factor of about two to one. As expected, the slowest performer on this test was the 128MB Liberty 50MOP drive; with its parallel-to-SCSI interface, the transfer took about 9½ minutes, compared with the SCSI Iomega's 2⅛ minutes. If we'd hooked up the Liberty drive to a SCSI adapter, we should have gotten results comparable with the Fujitsu drive's, since it uses the same mechanism.

On the Open Photoshop file test, most of the products performed well, with more than half the drives completing the test in less than 2 minutes. As in the prior test, the Liberty parallel unit was slowest, taking more than twice as long as the leaders. For our third test, we saved a modified version of the Photoshop file back to the hard disk. This generally took much longer than the previous test, and once again the Iomega and SyDOS products were significantly faster than the MO drives.

Our final benchmark was a Paradox for Windows database query. The MO drives performed very well, with the 230MB Pinnacle Micro and Valitek models actually outdoing the Iomega and SyDOS units.

The Iomega Transportable SCSI drive was the fastest drive overall, with the SyDOS Marlin 105i running a close second. It's interesting to note that the Marlin 105e was tested with an 8-bit SCSI card, whereas the Iomega Transportable used a 16-bit SCSI interface. (The cards for both drives were provided by the manufacturers.) It's likely that a 16-bit adapter would have meant better results for the Marlin 105e. In the one place we can compare otherwise identical units—the Iomega IDE and SCSI models—the SCSI unit had a performance advantage of between 10 and 15 percent overall.

Among the MO drives, the Pinnacle Micro Tahoe 230 was the fastest, actually outperforming two of the SyDOS magnetic units. The difference in overall performance between the first-place Iomega and the 230MB Pinnacle Micro MO drive was fairly significant, with the Pinnacle Micro drive lagging about 35 percent behind. However, the 230MB unit was about 25 percent faster on our test suite than its 128MB Pinnacle Micro stablemate.

Making the Right Choice

To choose the right drive for your needs, you have to weigh several factors. If cost is your main consideration—and you won't be using a ton of media—consider an Iomega or SyDOS drive. In addition to the products listed here, Iomega also offers dual-disk drives that double your online capacity (although each disk must be assigned its own drive letter). If you'll be storing a lot of

Greater Capacity, More Speed

By the time you read this, your options will have expanded as vendors ship drives handling higher-capacity media. SyQuest will soon have a 270MB magnetic 3½-inch drive (compatible with 105MB cartridges), along with a 200MB 5¼-inch drive (compatible with 88MB and 44MB cartridges).

A new generation of MO drives is pushing disk capacities to 230MB. We reviewed Pinnacle Micro's Tahoe 230—the first of this type available. These drives retain compatibility with industry-standard 128MB disks, and the Tahoe 230 offers a big improvement in speed (about 25 percent faster than Pinnacle's 128MB model). Many other vendors will market models soon, competitively priced with current 128MB products.

In addition, MOST—manufacturer of the Ocean drives in this article—has announced a hike in top disk capacity of its proprietary-format 3½-inch MO drives from 256MB to 384MB. The new drives will retain compatibility with MOST's 256MB media and industry-standard 128MB disks.

	Pinnacle Micro Tahoe 130	Pinnacle Micro Tahoe 230	PLI Infinity Optical 3.5"	Procom MEOD 130-E	Relax Sierra 128 Optical	Sony RMO-S350	Valitek PS12-MO128
	$980/$75	$1199[2]/$69	$1358/$36	$1285/$75	$1198/$36	$1589[2]/$59	$1295/$50
	128	230	128	128	128	128	128
	SCSI	SCSI	SCSI	SCSI	SCSI	SCSI	parallel/SCSI
	Pinnacle Micro OHD-130	Pinnacle Micro OHD-230	Sony SMO E-301	Fujitsu M2511A	Ricoh 3010E	Sony RMO S350	Panasonic LF3004
	28/8.3	30/3	38/10	30/8.3	38/10	40/10	40/10
	30,000	40,000	30,000	30,000	30,000	40,000	25,000
	32	256	64	256	256	64	128
	external[3]	external[3]	external[3]	external	external[3]	external	external parallel
	EZ-SCSI ASPI	EZ-SCSI ASPI	proprietary	proprietary	SCSI-Works ASPI	proprietary	proprietary
	●	●	○	○	●	●	●
	1	1	1	2	1	1	1
	●	○	●	●	○	●	●
	800/553-7070, 714/727-3300	800/553-7070, 714/727-3300	800/288-8754, 510/657-2211	800/800-8600, 714/852-1000	510/471-6112	800/352-7669, 408/432-0190	800/825-4835
	763	764	765	766	767	768	769

[5] Fits standard 5¼-inch externally accessible drive bay.

For more information about all products in this table, circle reader service no. 906.

data, the MOs have a higher initial buy-in, but the cost of the media is much lower. As a result, you'll probably find that your costs with the MO products will tend to run lower in the long run.

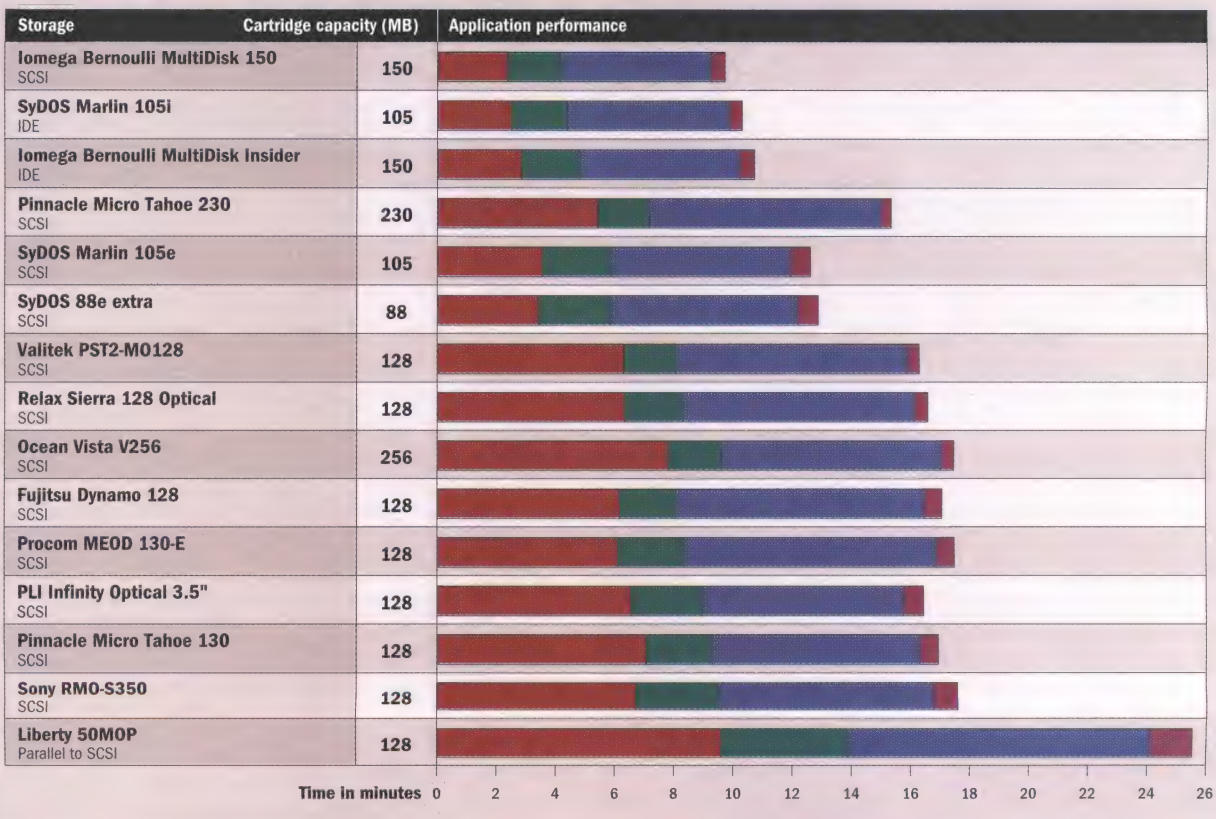
Because of its high capacity and reasonable media cost, the 230MB Pinnacle Micro MO drive provides the lowest cost per megabyte of any product we reviewed (assuming you'll be using 2GB or more of media). For a detailed breakdown and cost comparison with other storage media, including floppies, tape, and hard drives, see "Increasing Storage Means Decreasing Cost per Megabyte." Almost all the available media for the Iomega and SyDOS drives is manufactured by Iomega and SyQuest, although Iomega does offer an alternative to SyQuest media for some drives. MO media, on the other hand, is available from a number of manufacturers, so you can comparison-shop; just make sure you buy the media that's rated for your drive type.

Performance counts too, and depending on what you plan to use the drive for, speed can be the differentiating factor. For example, if you plan to occasionally run an application using the drive, you'll want the best performance you can get. The Iomega and SyDOS drives are by far the fastest devices here, and while these products can't match a modern hard disk's speed, you can effectively run applications from them. If you're exchanging data with others, the drives they use may dictate what you choose. If you'll be sharing the drive with others in your office or are using a laptop, the interface becomes important. Adding a SCSI card to every machine can be expensive. The Liberty and Valitek drives offer interfaces already provided on your computer, but as our tests show, you'll have to give up some performance to use them.

Matthew Leeds is the technical services manager for a major software publisher in the San Francisco Bay Area.

TEST REPORT

Magnetic Removables Faster Than MO Drives



Drives are ordered by overall performance, best to worst. Each test carries the same importance, even though some tests take much longer to complete than others, so a drive can be rated faster overall even if it takes a longer time to complete the full test suite.

Methodology
All drives were tested in a Compaq Deskpro/i 486SX-25 with 16MB of RAM, using the interface and drivers from the vendors. All programs used in testing were stored on the system's 120MB IDE hard drive, with data files only stored on the removable media.

Data transfer
We expanded a 19MB PKZip 2.0 file from the test system's hard drive onto the removable media. The expanded file was 35MB.

Open Photoshop file
We opened a 15.5MB Photoshop image file.

Save Photoshop file
We flipped the image in the 15.5MB Photoshop file and saved the file under a different name.

Paradox for Windows database query
We performed an indexed, joined multitable query using four database files totaling 7MB.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

HOW MUCH CAN ONE MAIL SYSTEM DO?

Can a mail system let you and everyone else in your office do more? Can it save you time, money and headaches? Can it keep you connected whether you're down the hall, or down under on an important business trip?

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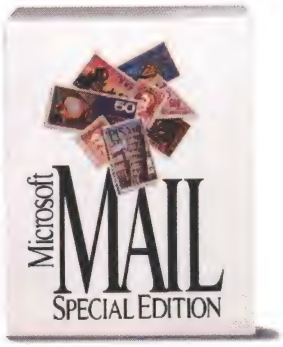

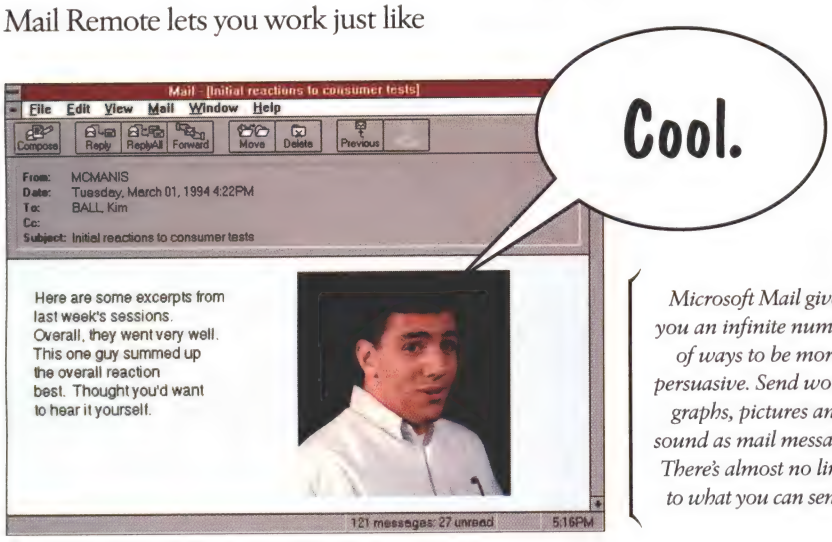

Microsoft Mail gives you an infinite number of ways to be more persuasive. Send words, graphs, pictures and sound as mail messages. There's almost no limit to what you can send.

Schedule+'s alarm clock reminds you of meetings, deadlines, anything. So you'll stay organized and save time. Without it, we might have forgotten this caption entirely.

Microsoft

1 BUDGET MOBILE PC **COMPAQ'S CONTURA AERO 4/33C Model 170 color subnote has broad appeal: It's powerful, has a 6¼-hour battery life, and sells for only $2448.**

1 POWER MOBILE PC **THE GATEWAY COLORBOOK DX2-50 comes with all the right pieces: a great color screen, long battery life, power to spare, and a decent $2995 price.**

1 BUDGET DESKTOP **THE GATEWAY P4D-66 BEST BUY: uncommonly good performance at a low cost. It's also one of the few DX2-66s left on the Power Desktops Top 20.**

1 POWER DESKTOP **DELL'S DIMENSION XPS P90 is the quintessential power PC: unmatched speed and great components, expandability, and support for $3999.**

A new month, new firsts—two Pentium-90s and a record-breaking subnote. On the pedestals: Dell's Dimension XPS P90, Compaq's Contura Aero 4/33C Model 170, and Gateway's P4D-66 Best Buy and ColorBook DX2-50.

TOP 20 PCs

PC POWER REDEFINED

BY BRYAN HASTINGS AND OWEN LINDERHOLM

We may as well trade in our analysis packages for crystal balls and Ouija boards. The most seasoned prognosticator could not have predicted the fabulous developments we're seeing in the PC market.

Who would have guessed, for example, that decked-out Pentium-90 systems would sell for less than many Pentium-66s and even some Pentium-60s? The Dell Dimension XPS P90 costs only $3999, and it's the fastest PC we've ever reviewed, plus it's brimming with high-end components. On the heels of the Dell is Gateway's $4127 Pentium-90 colossus, the P5-90.

For mobile PCs, Compaq's Contura Aero 4/33C Model 170 shook up the way we look at subnotebooks—this talented 5-pounder took us by surprise by capturing first place for budget mobiles *and* fifth for power mobiles. Gateway's ColorBook DX2-50 zoomed to the top of the power mobile PC category, and a major price drop on Gateway's P4D-66 Best Buy brought it to the top budget desktop spot, unseating Polywell's Poly 486-40DX.

Testing by Dean Andrews, Ulrike Diehlmann, and Susan Silvius; research and support by Gary Van Der Horn.

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MARC SIMON

Top 20s: Six Months Later

This month marks a half-year of *PC World* Top 20 roundups. We've seen some astonishing changes. Most remarkable are the steady price drops on high-end desktops. Fiercely resisting forays into its market share by AMD, Cyrix, and others, CPU giant Intel flooded the market with processors of all stripes, even competing with itself to some extent. Thirteen CPUs are represented in the 25 desktops and mobiles we reviewed this month, 11 of which come from Intel.

The result has been a boon for the PC buyer. Not only do you enjoy a wider selection of price/performance levels, you get much more for your money. DX2-66s and Pentium-60s dominated the Power Desktops chart in February, and Best Buy systems cost as much as $5395. Now systems with five different CPUs populate that chart, including three CPUs—Pentium-90, Pentium-66, and DX4-100—in the Best Buys. At the same time, the highest Best Buy price plunged to $4127. Monitor sizes and RAM amounts have stayed the same, but hard drives have become veritable data mansions. A power system had a hard drive as small as 170MB six months ago; 340MB is the smallest you'll find on such a system in July. PCI is also catching on: There are two PCI systems for every VL bus PC in July's Power Desktops chart, and this high-speed expansion slot is showing up in Budget Desktops as well.

Budget desktops got beefier. Enough so, in fact, that February's power desktops could be July's budget desktops. Average hard drive, RAM, and screen sizes gradually increased, and CPUs got a lot faster. February's budget desktops had a wide mix of 33- and 66-MHz CPUs, as well as a few in between. July's budget desktops are almost all DX2-66s, with one DX4-100 and, for the first time, a Pentium-60, MicroSource's $2375 Tempest Premier/PCI. We expect both the Pentium-60 and Intel's clock tripled DX4-100 to make serious inroads in the budget category over the next few months.

Big Changes in Small PCs

Intense competition is raising the bar on mobiles as well. The monochrome screen is fading fast from the notebook scene. For the first time since we started the Mobile PCs Top 20 in April, all the power systems have gone color, with over half of them using the brilliant active-matrix display. Nearly half this month's top ten budget notes have color as well. We're also seeing more speed, as DX2-50s and DX4-75s jockey for the top spots in the power category. True power is coming to even the smallest portables—the Compaq Contura Aero is the third subnote to make it onto our Power Mobile PCs list (Toshiba's Portégé T3400CT and T3400 were first and second). Meanwhile, 25- and 33-MHz SL and SX chips predominate in the budget mobile field.

PC Shopping: Pay the Right Price

Honest Al's Auto Emporium isn't the only place where the buyer must beware: Some computer vendors routinely overcharge customers. Whether you're buying a vehicle to get around town or to cruise the infobahn, these basic rules apply:

Know exactly what you want. Some reps will try to talk you into buying unneeded options.

Don't give the rep nonessential information until you get a firm quote. Some companies adjust quotes based on where you live and even which magazine you saw their system in. For example, Polywell reps often give higher quotes to East Coasters than to people in the West.

Shop around. Get written, detailed quotes from several vendors for the desired configuration. Also, don't be afraid to bargain. If you're interested in a system from one vendor but have a lower quote for the system from another, ask the salesperson to meet or beat that price. You'd be surprised how often that works.

Use a credit card. In case of dispute, the card company can help mediate or give a refund if you fail to receive a product.

Caveat emptor. In this intensely competitive market, even the computer press encounters the occasional vendor trick. Micro Express plans to market a Cyrix Cx486DX-40–based system, but the PC World Test Center discovered that the unit the company sent us was based on Intel's 486DX-33 CPU pushed to 40 MHz, producing artificially fast test results. The bottom line: You can never be too careful when shopping for a PC.

Whither the PC Market?

Intel-based systems virtually reign in Top 20–dom, but Intel knows it can't afford to rest on its laurels. In the short term, it faces immediate challenges such as AMD's 486DX-40 and its DX2-66 workalike, the AMD 486DX2-66 (see our number two and number seven budget desktops). Intel will also soon face pressure from the RISC (Reduced Instruction Set Computer) chip makers, who promise to deliver Pentium-level power at bargain-basement prices. RISC chip maker NexGen claims we'll soon see systems based on its processor that will deliver Pentium-60–level speeds for well under $2000, possibly as early as fall.

Bryan Hastings is an associate editor and Owen Linderholm a senior editor for PC World. *They can be reached on PC World Online (see page 12 for contact information).* PC World *staff members Mike Desmond, Ulrike Diehlmann, Rex Farrance, John Goddard, Anita Hamilton, Caroline Jones, and Susan Sikvius contributed to this article.*

Call 900/903-2972 and use the fax reprint numbers to order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports ($4.95). To order a month's complete review ($9.95 each), enter its number: December 3012; January 3001; February 3002; March 3003; April 3004; May 3005; June 3006; July 3007. For a list of all systems tested by the PC World Test Center for Top 20s ($4.95), enter 7. Touch-tone phone required; charges appear on your phone bill.

For more information about all products in this article, circle reader service no. 902.

This Month's Contenders

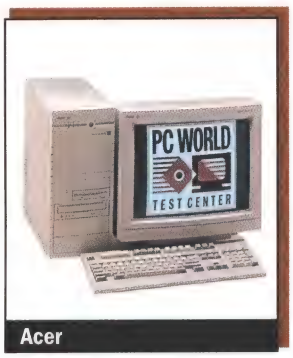
Our look at this month's contenders for the Top 20 power and budget desktops and the Top 20 mobile PCs. Icons show where systems placed on the Top 20 charts.

AcerPower 9000T

PROS: 17-inch monitor, nice multimedia bundle, good expandability
CONS: Expensive, below-average reader satisfaction with PC problem resolution

Acer's well-dressed multimedia tower comes with a fast CD ROM drive, a 16-bit audio card, speakers, and a 540MB hard disk to store bulky sound and video files. The PC also excels in video—a 2MB PCI graphics card and a 17-inch monitor deliver sharp image quality at up to 1280 by 1024 resolution. Six expansion slots and four drive bays are free, and you have lots of room to upgrade RAM before you have to replace the original SIMMs.

It's too bad the AcerPower 9000T stumbles in key areas. $3695 is a lot of money for a 60-MHz Pentium PC these days, and, despite its 8MB of RAM, this machine noticeably lagged behind its peers. System design could be better, too: The case is durable, but opening and closing it is hard, and the motherboard flexes. Finally, while support policies include the basics and Acer gives you nonstop tech support, the company fared below average on our Reliability and Service Monitor fax survey. Of the Acer PC owners who responded and who'd had a problem with their system, 1 in 3 said they could not get the problem resolved satisfactorily. These drawbacks keep the otherwise hearty 9000T off our Top 20 charts. *Acer America, 800/733-2237* **Reader service no. 682**



Acer

Acom VESA-4000

PC WORLD TOP 20
10 POWER MOBILE PC

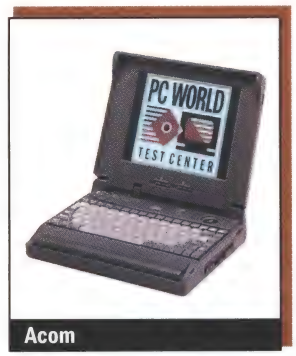
PROS: Superb performance, vibrant color display, large hard drive
CONS: Pricey, short battery life

Sure, a notebook will never *really* replace a desktop, but Acom's totable is a great attempt at it. This DX2-66's 16MB of RAM, 128K secondary cache, and local bus video add up to killer speed—it's one of the top five notebook performers to date—and its 328MB hard drive is roomy even by desktop standards. This bundle of TNT comes with a 9½-inch display that explodes with color.

All that said, the VESA-4000 doesn't entirely let you forget it's a notebook. The keyboard is cramped, and the tiny built-in trackball, with its tightly bunched mouse keys, can be awkward to use. Need another reminder? The system conks out after less than 2½ hours on the battery—not surprising considering the high-speed components, nickel-cadmium (NiCd) battery, and active-matrix display.

Like any notebook that's worth its silicon, the Acom VESA-4000 accepts PCMCIA cards. The system is a choice candidate to work with a docking station, and Acom sells one that's decked out for multimedia for an additional $425.

The service-and-support package offers no surprises. Policies are mostly standard, and we reached technicians on the toll-free tech support line in less than 3 minutes on average. Reps answered all of our questions adequately.



Acom

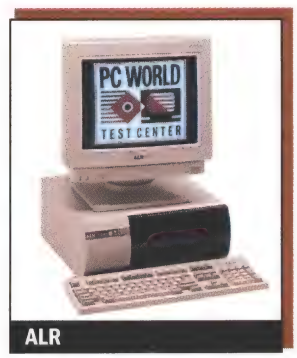
The Acom VESA-4000 combines terrific performance, a beautiful color screen, and a spacious hard drive, earning it a place on our Power Mobile PCs chart. Though its steep $4295 price makes it anything but a budget system, it's clearly a high-ranking power notebook. Give the VESA-4000 a close look, especially if you want your notebook to double as the core of your desktop station back at the office. *Acom, 800/898-2665* **Reader service no. 683**

ALR Evolution IV 4/100

PC WORLD TOP 20
20 POWER DESKTOP

PROS: Good expandability, above-average support
CONS: None

ALR's $2919 compact is a DX4-100 PC with real pep—not only did it leave virtually all DX2-66s in its wake, its 8MB of RAM helped it edge past some Pentium-60s. The Evolution IV 4/100 also is thoughtfully designed. The front panel's drive cover shields from the elements the floppy drive and any others you install in the two free front-panel drive bays. The neat internal layout and integrated adapter for the system's generous 425MB hard drive leave room for two more drives and five expansion cards. The only board in the system is the 1MB VL bus video controller, a nice match for the 15-inch screen. Two free SIMM sockets offer lots of upgrade room.



ALR

The company's support policy offers the essentials, plus a generous warranty and phone support that's available every day except Sunday. ALR had mixed results in our Reliability and Service Monitor, however: Owners who experienced system problems had to wait on hold for tech support for an average of 7 minutes, but the vast majority of those callers got their problems resolved.

ALR's latest Evolution is a quick, well-designed system with room to grow and decent support—it cruises into our Power Desktops Top 20. *ALR, 800/444-4257, 714/581-6770* **Reader service no. 684**

Ambra T466I/VL

PROS: Large hard drive, inexpensive PCI upgrade
CONS: Poor showing on Reliability and Service Monitor

Ambra's $2808 T466I/VL minitower is one of the most capable DX2-66s going. It's got 16MB of RAM and a full secondary cache, which spurred it to great performance for its class, even putting it abreast of a few Pentium-60s we've tested. This well-designed sys-

THE TOP 20

PC WORLD POWER DESKTOPS

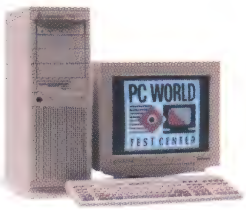
1 Dell Dimension XPS P90
Screams power, features, and value.

New this month
Up from last month
No change from last month
Down from last month

BEST BUYS	Last month	Months on list	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)	Bus slots
1 Dell Dimension XPS P90	–	1	97	93	76/83	$3999	Pentium-90	16	1080	ISA, PCI
2 Zeos Pantera 66	1	2	92	89	72/82	$3495	Pentium-66	16	528	ISA, PCI
3 Gateway P5-66	3	2	90	83	73/77	$3430	Pentium-66	16	540	ISA, PCI
4 Gateway P5-90	–	1	89	92	73/77	$4127	Pentium-90	16	540	ISA, PCI
5 Micron 4100PCI Magnum	2	2	88	72	65/86	$3199	DX4-100	16	545	ISA, PCI
6 IBM PC Company ValuePoint P/60D	4	6	87	80	83/78	$4728	Pentium-60	16	424	ISA, PCI
7 Zeos 486DX2-66	6	2	86	67	72/82	$2637	486DX2-66	8	528	ISA, VLB
8 Micron P60 PCI PowerStation	5	3	86	75	65/86	$4138	Pentium-60	16	540	ISA, PCI
9 ALR Evolution V	8	6	86	81	78/75	$4003	Pentium-60	16	540	ISA, VLB
10 Gateway P4D-66 Best Buy	7	2	86	60	73/77	$2295	486DX2-66	8	540	ISA, PCI
11 AST Premmia LX P/60	–	1	86	78	79/79	$4138	Pentium-60	16	540	ISA, PCI
12 Gateway P5-60 Best Buy	14	3	84	70	73/77	$2610	Pentium-60	8	540	ISA, PCI
13 Axik Ace Cache 586-66PCI/MPC	13	2	84	85	69/70	$4198	Pentium-66	16	525	ISA, PCI
14 Compaq Deskpro XE 560 525/w	–	1	84	77	83/77	$4216	Pentium-60	8	525	ISA
15 Packard Bell Pentium Computer	–	1	83	65	79/70	$3000	Pentium-60	8	420	ISA, PCI
16 Austin Power System 60	9	5	83	64	70/80	$2979	Pentium-60	8	420	ISA, PCI
17 ALR Evolution V ST/66	16	2	83	80	78/75	$4776	Pentium-66	16	540	ISA, VLB
18 CompuAdd C466D	20	3	83	56	78/75	$2295	486DX2-66	8	425	ISA, VLB
19 HP Vectra VL2 4/100	–	1	83	78	85/77	$2899	DX4-100	8	340	ISA
20 ALR Evolution IV 4/100	–	1	83	66	78/75	$2919	DX4-100	8	425	ISA, VLB

[1] Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports ($4.95); a complete month's review ($9.95 each; December 3012, January 3001, February 3002, March 3003, April 3004, May 3005, June 3006, July

2 Zeos Pantera 66
Fast Pentium-66 all-rounder.



3 Gateway P5-66
Loaded Pentium-66.

4 Gateway P5-90
Great speed, screen, value.

5 Micron 4100PCI Magnum
Lowest-cost power Best Buy.

Monitor size/ dot pitch	Vendor contact number	Issue reviewed	Fax reprint number [1]	Comments
15"/.28	800/289-3355	current	3113	Pentium-90 blasts straight by other systems as the fastest and best-value power system.
15"/.28	800/554-5220	June 94	3091	Well-priced tower is the fastest Pentium-66 we've ever tested.
17"/.26	800/846-2000	June 94	3093	Blazing Pentium-66 comes with 17-inch monitor at a low price.
17"/.26	800/846-2000	current	3114	Superfast Pentium-90 is topped only by no. 1 Dell system in performance.
15"/.28	800/438-3343	June 94	3092	Low-cost, loaded DX4-100 outpaces some Pentiums.
15"/.28	800/772-2227	Jan 94	3041	High price nudged this PC out of the Best Buy ranks, but IBM's good reliability helps keep its rating high.
14"/.28	800/554-5220	June 94	3095	Fastest DX2-66 on Power Top 20; could use a larger monitor.
17"/.26	800/438-3343	May 94	3094	4MB caching controller, 17-inch monitor, excellent service.
14"/.28	800/444-4257	Jan 94	3044	Needs a bigger monitor but is a good all-around PC.
15"/.28	800/846-2000	June 94	3096	Also no. 1 budget Best Buy. Good, fast, $120 less than it was last month.
15"/.28	800/876-4278	current	3115	Nice remake of AST's rock-solid Pentium-60 reviewed in February.
14"/.28	800/846-2000	May 94	3099	Inexpensive but needs a bigger monitor. Almost qualifies for Budget Top 20.
15"/.28	800/234-2945	June 94	3098	Exceptionally fast Pentium-66 can't keep up in value with Pentium-90s.
15"/.28	800/345-1518	current	3116	Great reliability but pricey.
17"/.28	800/733-4411	current	3117	Good all-around Pentium with 17-inch monitor; stumbles on service and support.
15"/.28	800/752-1577	Mar 94	3062	Basic low-cost system; performance a bit sluggish for its class.
15"/.28	800/444-4257	June 94	3101	Fast Pentium-66, high price.
15"/.28	800/627-1961	May 94	3103	Loaded, expandable, also no. 3 budget Best Buy.
14"/.28	800/752-0900	current	3118	Fastest DX4-100 we've tested bests many Pentiums at a moderate price; monitor could be bigger.
15"/.28	800/444-4257	current	3119	Lower price than you'd expect for a solid power system.

3007); and a list of all systems tested by the PC World Test Center for the Top 20s ($4.95).
Touch-tone phone required. Charges will appear on your telephone bill.

tem also has the goods in peripherals and expandability. The 15-inch monitor and 2MB video adapter make a nice team, and most users will be happy with the 540MB hard drive and the four free drive bays and eight free expansion slots. You can even get a PCI card for $99. However, all SIMM sockets are filled.

Ambra

Ambra falters on support. Nonstop phone support is an excellent policy, but the company's seven-day turnaround time on service center repairs is too long. Furthermore, Ambra system owners who responded to our Reliability and Service Monitor reported a higher-than-average dead-on-arrival (DOA) rate for new systems and a relatively low satisfaction rate with problem resolution.

This PC's price is right, but considering Ambra's support troubles, the T466I/VL falls short of our Top 20 lists. *Ambra Computer, 800/252-6272* **Reader service no. 685**

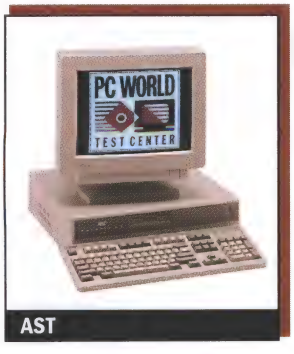
AST Premmia LX P/60

PC WORLD TOP 20
11 POWER DESKTOP

PROS: Fast; good tech support
CONS: Expensive

AST's latest Premmia, a well-rounded power desktop, replaces the AST Premmia that we reviewed in February. The Premmia LX P/60's 60-MHz Pentium CPU, 16MB of RAM, and 256K of secondary cache pack a wallop—this is one of the fastest Pentium-60 systems we've tested, and it posted an exceptionally good score on our Paradox for Windows benchmark. The LX P/60's 540MB hard drive gives you ample file storage. The video system is also high end: The integrated graphics accelerator supports resolutions of up to 1280 by 1024, and the 15-inch monitor enables you to comfortably view up to 1024 by 768 resolution—as high as most mainstream Windows users need to go.

The good news continues. Expandability is excellent for a desktop—two bays are available, and you have two PCI and three ISA slots at your disposal. Two free SIMM sockets let you add plenty of RAM without having to remove modules. The motherboard is cleanly laid out, and all slots and sockets are in easy reach.



AST

AST delivers an above-average service-and-support package. The company's policies are decent, and not only are support reps always available, they appear to be doing their job well. Over 1000 AST users had responded to our Reliability and Service Monitor by the time we wrote this article; of those who reported problems with their system, the great majority got satisfaction from AST.

However, AST didn't defend its price leader reputation as vigorously as usual. $4138 is a lot for a Pentium-60, which keeps the Premmia away from a Best Buy, but it lands firmly in our Power Desktops Top 20. *AST Research, 800/876-4278* **Reader service no. 686**

ATronics PCI Emerald

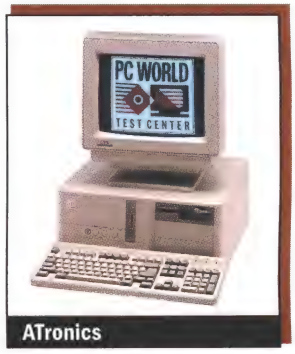
PC WORLD TOP 20
4 BUDGET DESKTOP

PROS: Economical, good Paradox for DOS performance
CONS: Motherboard flexes, drab service and support

The DX2-66 is the ruler of the budget systems, but it's still news when one of these PCs comes in at under $2000. ATronics's modestly configured but capable DX2-66 compact soared to a fourth-place Best Buy for budget desktops, due largely to its $1995 price.

Its frills are few. The PCI Emerald's 256MB hard drive and 14-inch monitor are near the minimum for today's Windows PCs. However, 8MB of RAM and 256K of secondary cache helped this machine's overall performance noticeably exceed that of the median desktop. It also turned in a particularly good Paradox for DOS score among DX2-66s, perhaps due to its zippy hard drive and PCI local bus hard drive adapter.

This compact has a surprising amount of growth potential. It provides you with seven free expansion slots and, even with both floppy drives installed, three free externally accessible drive bays. The CPU and SIMM sockets are in easy reach, and you can pack in lots of RAM before you have to start pulling original modules. The PCI Emerald is also flexible in a less desirable sense of the word: The motherboard bowed severely when we pressed on it slightly.



ATronics

ATronics's service and support is a little lacking. Policies are run-of-the-mill, and tech support is available by phone only 9 hours a day, weekends excluded. And after all our anonymous calls, we had to wait a couple of hours for callbacks from support reps. When we finally heard back, however, reps answered all questions accurately.

ATronics's support could be stronger. However, given the amount of system you get for the money, and all the room the PC has for expansion, the ATronics PCI Emerald earns a fourth-place Best Buy on our Budget Desktops chart. *ATronics Int'l, 800/488-7776* **Reader service no. 687**

Compaq Contura Aero 4/33C 170

PC WORLD TOP 20
1 BUDGET MOBILE PC
5 POWER MOBILE PC

PROS: Affordable, color screen, marathon battery life
CONS: No video port, long hold times for tech support

The true test of a mobile PC can come unexpectedly. The Friday this review was due, an electrical fire drove *PC World*ers out of our offices. This reviewer grabbed some charts and the Compaq Contura Aero 4/33C Model 170 and dashed out, alighting at a nearby coffeehouse. With *caffe latte* in hand and a feeling of apprehension (having struggled with subnotebooks before), I settled in and hoped for the best. The Aero came through with flying colors.

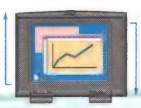
And I do mean colors. The Aero is one of only two subnotes we've seen with a color screen, and it's quite readable for a passive display. The keyboard felt cramped at first, but its keys' comfortable action made it easy to get used to. The pointer setup was a little suspect at first—the marble-size trackball is at the front right of

WinBook XP

HIGHEST QUALITY, BEST FEATURES, LOWEST PRICE!

SUPERFAST INTEL DX4-75MHz WITH LOCAL BUS VIDEO ACCELERATED GRAPHICS, UP TO 32MB RAM AND HARD DRIVE CAPACITY TO 520MB

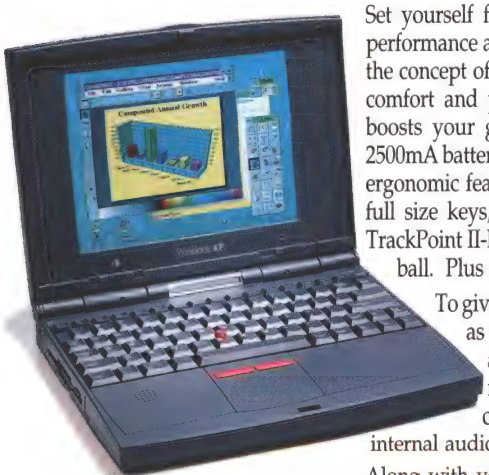
LONGER BATTERY LIFE WITH TEN-CELL 2500mA NiMH BATTERIES



UPGRADABLE SCREEN AND USER-EXPANDABLE RAM, REMOVABLE HARD DRIVE AND PCMCIA CAPABILITIES

SUPERB ERGONOMICS AND KEYBOARD WITH FULL SIZE KEYS, SLOPING WRIST REST PLUS A CHOICE OF POINTING DEVICES

Take a permanent vacation from your desktop with the 75MHz WinBook XP



Set yourself free from your desktop and move up to new heights in performance and value with the 75MHz WinBook® XP. Never before has the concept of "desktop replacement" been so closely matched in power, comfort and price. The 32-bit local bus video Rocketchip accelerator boosts your graphics performance level along with a ten-cell NiMH 2500mA battery pack that will keep you running. You get the same unique ergonomic features that critics raved about with the original WinBook—full size keys, a sloping wrist rest, and now your choice between the TrackPoint II-like pointing device or an optional 19mm dual-button trackball. Plus an LCD indicator lets you to monitor functions at a glance.

To give the WinBook XP a big future, you can upgrade components as you need to with user-upgradable RAM to 32MB, upgradable screen (to a larger dual-scan color or active matrix), removable hard drives to 520MB capacity and PCMCIA capabilities. Options include a 14.4 fax/voice/data modem, internal audio and docking station.

Along with your WinBook XP, you get excellent support and a 30-day money-back guarantee. You also get quick service turn-around, a one-year limited warranty on parts and labor plus toll-free technical support for the life of your computer. Your purchase is backed by our 15 years of computer experience and over 2.2 million satisfied customers.

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WinBook XP features

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- 4 OR 8MB RAM (EXPANDS TO 16 OR 32MB)
- 3.5" 1.44MB DISKETTE DRIVE
- REMOVABLE 120 TO 520MB HARD DRIVE
- 10.3" OR 9.4" VGA DUAL SCAN STN COLOR OR OPTIONAL 9.5" ACTIVE MATRIX DISPLAY
- 10-CELL 2500mA NiMH BATTERY & AC PACK
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- 120MB Hard Drive

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- 10.3" Dual Scan Color Display
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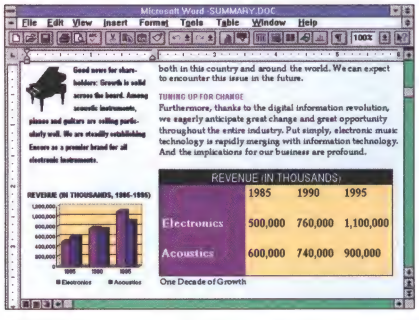
A MILLION WORDPERFECT MICROSOFT WORD. MAKE

More and more people are coming aboard the most popular word processor for Windows.™ That's understandable. After all, Microsoft® Word is the world's best-selling word processor.

As well as the most acclaimed. *InfoWorld* recently stated, "We found Microsoft Word 6.0 for Windows to be the best all-around word processing program." In addition to this, *PC Magazine* has referred to it as "...probably the most elegant and powerful word processor ever written."



With just the click of a button, Word's custom toolbar lets you add graphics, make tables, and bring in data from other programs.

We've also made switching to Word extremely convenient. As a million WordPerfect® users found out, Word not only converts their old files with the formatting intact, but allows you to type in familiar WordPerfect commands, while showing you the corresponding Word command. So you can learn as you work. All the time discovering features in Word that weren't available to you before.

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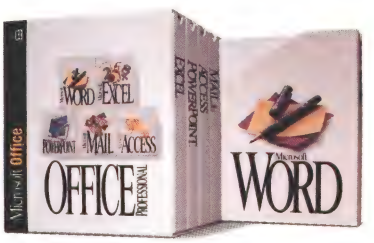
Meanwhile, Word is a part of the Microsoft Office, where every program works together like one. So now it's even easier to share data between programs without leaving your document. It's simply our OfficeLinks integration that



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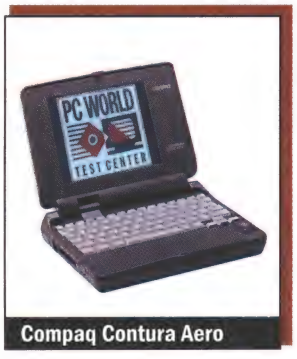
the keyboard, with the buttons mounted well away from it on the PC's right panel—but it, too, turned out to be pleasant to use. Despite the café's appalling lack of outlets, the Aero kept going for an afternoon of furious work. In our formal battery rundown tests, the Aero's nickel–metal-hydride (NiMH) pack trooped on for 6 hours and 18 minutes .

Simply put, the Aero is nearly as easy to use as a full-size notebook. In fact, it has almost as much functionality as one. The 8MB of RAM and 171MB hard drive are plenty for the nomadic Windows user. And while Compaq isn't trumpeting its use of a 16-bit motherboard (32-bit is the norm), the Aero's narrower data bus didn't pose a performance problem. The Aero edged past the median notebook in our tests.



Compaq Contura Aero

Sure, we have nitpicks. Why isn't there an easy way to connect an external screen? As it is, you have to use the optional docking station. Also, the external floppy drive snaps up the lone PCMCIA slot. And while Compaq's support generally excels, from its three-year warranty to well-trained tech reps who are always available, 7 minutes is too long to wait on the phone. However, Compaq has been steadily beating down hold times with infusions of new mobile computer staff.

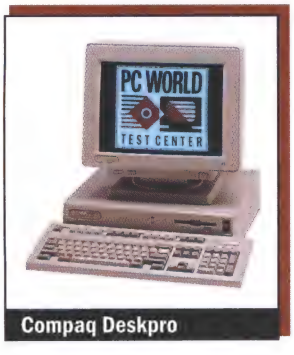
Quibbles aside, the Aero has more than we've ever seen in a subnote. With its sleek gray case and sculpted edges, this sturdy little unit even looks good. For $2448, few mobile-PC seekers can go wrong with it. The Compaq Contura Aero lands at the top of our Budget list and places fifth on our Power list. *Compaq Computer, 800/345-1518* **Reader service no. 688**

Compaq Deskpro XE 560 525/w

PC WORLD TOP 20 14 POWER DESKTOP

PROS: Fast, easy-to-use interface, built-in sound
CONS: High price, long waits for tech support

With Pentium-60 PC prices dipping below $3000, $4216 for such a system may not sound like a great bargain. However, Compaq delivers a well-crafted and reasonably well-stocked system for the money. The Deskpro XE 560 Model 525/w, which comes with 8MB of RAM, nosed past the median Pentium-60, doing particularly well on our DOS application tests. Its components are also of good quality. The system's 525MB hard drive is roomy, and the 15-inch monitor is amply supported by the 1MB integrated local bus video adapter. In addition, you get the two extras found on most new Compaqs: TabWorks, a Windows shell that's a friendly alternative to the Windows desktop, and integrated Business Audio sound and a microphone.



Compaq Deskpro

Compaq made its little compact quite expandable. Designers integrated all the components they could into the motherboard, minimizing clutter and maximizing expansion. You have three slots and a drive bay at your disposal, as well as four free SIMM sockets, giving you loads of RAM upgradability.

It's hard to beat Compaq's support policies, which include a three-year warranty, nonstop phone support, and free on-site service, and reps answered all our questions accurately. Nine minutes is still too long to stay on hold, but Compaq is adding desktop support staff, which should reduce the wait.

High price and long tech support hold times keep the Compaq Deskpro from attaining a Best Buy. Still, it's fast even for a Pentium-60, and it's decently outfitted. These attributes put it at number 14 on our Power Desktops Top 20. *Compaq Computer, 800/345-1518* **Reader service no. 689**

Dell Dimension XPS P90

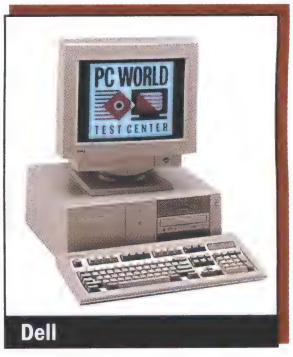
PC WORLD TOP 20 1 POWER DESKTOP

PROS: Fastest PC yet, huge Enhanced IDE hard drive, multimedia, high customer satisfaction
CONS: No set return time on service center repairs

If it's the ultimate power PC you're after, read on. Dell sent us so much PC for the $3999 price, the system rocketed straight to the top of our Power Desktops Top 20.

Let's talk about performance. While the rival Pentium-90 in this review, the Gateway P5-90, beat out the Dimension XPS P90 in the Excel, WinWord, and Paradox for Windows tests, the Dell trounced it in the DOS application tests and set a new speed record for Freelance for Windows. The core of this compact's unsurpassed performance is Intel's new 90-MHz Pentium CPU, the most powerful available in any PC at this writing, and it's amply buttressed by 16MB of RAM.

Let's talk about peripherals. Is a gigabyte enough hard disk space for you? The XPS P90 is also decked out for multimedia, with a double-speed CD ROM drive, a 16-bit sound card, and speakers. The 64-bit PCI video controller, packed with 4MB of video RAM, is superfast and offers way more resolution than the 15-inch monitor (or at least the viewer) can comfortably handle.



Dell

Let's talk about expandability. Dell built the PCI-based Enhanced IDE interface into the motherboard, leaving six slots free. If the 1080MB hard disk doesn't give you enough storage for the rest of your life, you can add a second Enhanced IDE drive. You can plug in 80MB of RAM before you have to discard SIMMs.

Finally, let's talk about Dell's excellent service and support. True, the warranty is basic and the company loses a few points for failing to offer a guaranteed turnaround time on service center repairs. However, phone support is available nonstop, and reps answered our anonymous calls in under 3 minutes on average. Furthermore, our Reliability and Service Monitor shows that Dell has some of the highest customer satisfaction scores in the business. Of the nearly 2000 Dell owners who responded to our survey, those who had had trouble with their system reported in outstanding numbers that the company resolved their problems.

Color (kul'ər) *n.* 1. A feature rarely found in low-cost inkjet or dot-matrix printers. *example:* the **TI microMarc™ Color** printer gives you vivid color for not much more than the cost of a black and white inkjet.

THE UNDER $400 PRINTER, REDEFINED.

If you thought you'd never see a high-quality color printer for a street price under $400,* wait'll you see the new TI microMarc Color, the inkjet printer that's as versatile as you are. At home, you can brighten up schoolwork, do newsletters – even print the rich, detailed colors of today's multimedia applications. At the office, you can add brilliant colors to proposals, charts and presentations. And if that's not enough, just compare the microMarc Color to our leading competitor, HP. From print quality all the way down to printer size, our advantages are obvious. In fact, we're so confident you'll like the new TI microMarc Color, we'll give you our 30-day satisfaction guarantee.** For more information or a dealer near you, call *1-800-TI TEXAS* (1-800-848-3927).

	TI microMarc Color	HP DeskJet™ 500C
Print Quality: Graphics	*300 dpi x 300 dpi*	*300 dpi x 300 dpi*
Resident Fonts	*600 dpi x 300 dpi*	*300 dpi x 300 dpi*
Speed: Color	*Up to 1 ppm*	*Up to .67 ppm*
Monochrome	*Up to 5 ppm*	*Up to 3 ppm*
Memory	*128K*	*48K*
Paper Tray	*120 sheets*	*100 sheets*
Standard Fonts	*5*	*3*
Weight	*11 lbs.*	*14 lbs.*

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*Estimated dealer price. Dealer prices will vary. **Offer applies if returned in good condition. microMarc and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. DeskJet is a trademark of Hewlett-Packard, Inc. Specifications in chart are based on information as of 4/94. © 1994 TI.

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THE TOP 20

PC WORLD BUDGET DESKTOPS

1 Gateway P4D-66 Best Buy
Power system, budget price.

New this month ▶ | Up from last month ▲ | No change from last month ◀ | Down from last month ▼

BEST BUYS	Last month	Months on list	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)	Bus slots
1 ▲ Gateway P4D-66 Best Buy	2	2	88	60	73/77	$2295	486DX2-66	8	540	ISA, PCI
2 ▼ Polywell Poly 486-40DX	1	2	87	51	69/71	$1650	AMD 486DX-40	8	270	ISA, VLB
3 ◀ CompuAdd C466D	3	3	87	56	78/75	$2295	486DX2-66	8	425	ISA, VLB
4 ▶ ATronics PCI Emerald	—	1	86	59	69/69	$1995	486DX2-66	8	256	ISA, PCI
5 ▲ Inmac 466P	7	6	86	53	69/76	$1787	486DX2-66	8	255	ISA
6 ▼ Everex Step VL EISA DX2/66	4	3	84	58	83/68	$2349	486DX2-66	8	240	EISA, VLB
7 ▶ MidWest Micro 486DX2-66	—	1	83	51	69/68	$1899	AMD 486DX2-66	8	341	ISA, VLB
8 ▲ Dell OptiPlex 4100/L	13	2	82	71	76/83	$2499	DX4-100	8	170	ISA
9 ▲ AST Bravo MT 466d	12	6	82	53	79/79	$2150	486DX2-66	8	170	ISA
10 ▼ Acma 486DX2-66 PCMCIA System	5	3	82	54	72/81	$2142	486DX2-66	8	340	ISA, VLB
11 ▼ Axik 486DX2-66PCI	8	5	82	57	69/70	$2259	486DX2-66	8	340	ISA, PCI
12 ▲ CompuAdd C433S Low Profile	15	6	82	39	78/75	$1670	486SX-33	8	210	ISA
13 ▼ Austin Premier 486 System	11	2	82	50	70/80	$2199	486DX2-66	8	341	ISA, VLB
14 ▶ MicroSource Tempest Premier/PCI	—	1	82	65	69/70	$2375	Pentium-60	8	341	ISA, PCI
15 ▼ Quantex Q486DX2/66MM-4	9	2	81	55	69/69	$2305	486DX2-66	8	540	ISA, VLB
16 ▼ Polywell Poly 4586VR	6	6	81	61	69/71	$2195	486DX2-66	8	340	ISA, VLB
17 ▼ Shasta Prestige Desktop	10	4	81	51	69/68	$1795	486DX2-66	8	340	ISA, VLB
18 ▼ IBM PS/1 Consultant DX2-66	16	6	81	42	83/78	$2329	486DX2-66	8	420	ISA
19 ▼ Netis N433VL	14	6	80	38	69/69	$1559	486DX-33	8	250	ISA, VLB
20 ▼ Netis N 466 VL Power Station	17	6	80	51	69/69	$1850	486DX2-66	4	250	ISA, VLB

[1] Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports ($4.95); a complete month's review ($9.95 each; December 3012, January 3001, February 3002, March 3003, April 3004, May 3005, June 3006, July

2 Polywell Poly 486-40DX
Fast, terrific price.

3 CompuAdd C466D
Great deal on a DX2-66.

4 ATronics PCI Emerald
A speedy, low-cost gem.

5 Inmac 466P
Inexpensive DX2-66.

Monitor size/ dot pitch	Vendor contact number	Issue reviewed	Fax reprint number [1]	Comments
15"/.28	800/846-2000	June 94	3096	Price drop takes this fast, loaded DX2-66 to no. 1.
14"/.28	800/999-1278	June 94	3104	Lowest-cost Best Buy. Based on surprisingly fast AMD 486DX-40.
15"/.28	800/627-1961	May 94	3103	Good price and performance, large hard drive.
14"/.28	800/488-7776	current	3120	Low-cost PCI-based 486DX2-66 with good speed for its class.
14"/.28	800/547-5444	Feb 94	3056	Solid system gains Best Buy based on big price drop.
15"/.28	800/821-0806	Dec 93	3105	Great reliability, EISA bus.
15"/.28	800/728-8582	current	3121	Good value shows that AMD 486DX2-66 can hold its own.
14"/.28	800/247-4739	June 94	3111	Compact desktop is by far the fastest on the Budget Top 20. Lacks expandability.
15"/.28	800/876-4278	Feb 94	3110	Good reliability and service; needs a bigger hard drive.
15"/.28	800/786-6888	May 94	3106	Minitower comes with built-in PCMCIA. Good desktop for notebook owners.
14"/.28	800/234-2945	Mar 94	3063	Solid PCI DX2-66 at a reasonable price.
14"/.28	800/627-1961	Dec 93	3031	Only SX-33 to break the Top 20. Helped by low price.
14"/.28	800/752-1577	June 94	3109	Good all-around system with decent hard drive.
14"/.28	800/848-5161	current	3122	First Pentium to make the budget list.
15"/.28	800/288-0566	June 94	3107	Best value multimedia system even includes a fax-modem; lacks flexible RAM upgrade.
15"/.28	800/999-1278	Dec 93	3050	Fastest DX2-66 on Budget Top 20, but you have to pull RAM to add RAM.
15"/.28	800/546-9888	Apr 94	3108	Second cheapest DX2-66 here; RAM upgrade path limited.
14"/.28	800/426-3377	Feb 94	3025	User-friendly features; Energy Star compliant; has fast modem. Slightly slower than average for a DX2-66.
14"/.28	800/577-7526	Dec 93	3021	Low price keeps this DX-33 on the chart, but there are better deals higher up.
14"/.28	800/577-7526	Feb 94	3022	DX2-66 is bare-bones but cheap.

3007); and a list of all systems tested by the PC World Test Center for the Top 20s ($4.95).
Touch-tone phone required. Charges will appear on your telephone bill.

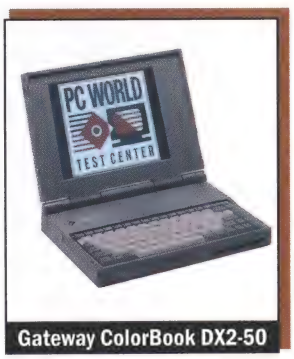
In short, Dell hits a grand slam with its latest system. You get incredible performance in a feature-packed compact that's an all-star as both a multimedia station and a server and that's backed by Dell's exemplary support. The Dimension XPS P90 clearly earns this month's number one power desktop Best Buy. *Dell Computer, 800/289-3355* **Reader service no. 690**

Gateway ColorBook DX2-50

PC WORLD TOP 20 1 POWER MOBILE PC

PROS: Fast, affordable, long battery life, nice display
CONS: Hitches in service and support, keyboard rattles

If the ColorBook DX2-50 isn't the dream power notebook, it's the closest one we've seen to it. At $2995, Gateway's new mobile PC is an astonishing value. This computer showed remarkable verve in our benchmarks, racing through our application tests considerably faster than the median 486 notebook, outpacing half the DX2-66 notebooks we've reviewed. Yet even with life in the fast lane, the ColorBook DX2-50 held out for 4½ hours in our battery test. Despite big performance, the ColorBook DX2-50 adds only a little more than 7 pounds to your briefcase.



Gateway ColorBook DX2-50

The good news keeps on coming. The dual-scan screen is sharp for a passive color display. The unit also includes 8MB of RAM, a removable 250MB hard drive, and a PCMCIA slot. We like the built-in trackball assembly, which telescopes out of the PC's front panel. However, some may find the action on the trackball and the keyboard keys loose, with the latter tending to rattle.

The only major aspect of this system that didn't sweep us off our feet is the service-and-support package. Gateway offers competitive policies, including long phone support hours on weekdays and Saturday hours. However, it doesn't guarantee a turnaround time on service center repairs, and we had to wait on hold for 8 minutes, or leave messages and wait several hours for callbacks. In addition, the reps missed our most difficult question. Gateway mobile PC owners responding to our Reliability and Service Monitor reported a higher-than-average number of problems and DOA products, but the vast majority of the readers who reported problems were satisfied with the way the company resolved them.

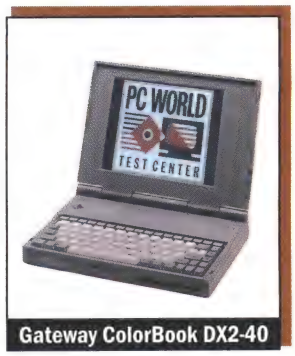
The ColorBook DX2-50 is one of the best traveling PCs you can buy. Despite support drawbacks, this computer's terrific combination of speed, long battery life, good components, and reasonable price catapulted it to our top Best Buy spot for power mobile PCs. *Gateway 2000, 800/846-2000, 605/232-2000* **Reader service no. 691**

Gateway ColorBook DX2-40

PC WORLD TOP 20 7 POWER MOBILE PC

PROS: Good performance, reasonable price, near 5-hour battery life, nice color screen
CONS: Snags in service and support, keyboard rattles, can't charge unit while running on AC

If you want the features of the ColorBook DX2-50, want to save $231, and don't mind a small performance hit, consider this version of the aforementioned ColorBook. The DX2-40 is not as peppy as its sibling, only matching the speed of our comparison notebook. Other than that, this $2764 unit offers the same great features, and you even get an additional 21 minutes out of the battery, bringing the total computing time away from wall power to 4 hours and 50 minutes. However, the ColorBook DX2-40 also has the same drawbacks: a loose-action keyboard and service-and-support problems.



Gateway ColorBook DX2-40

If you're choosing between the 40- and 50-MHz versions of the ColorBook, you need to decide if the marginally lower cost and extra few minutes of battery time are worth the modest performance hit—the ColorBook DX2-40 wound up seventh on our Power Mobile PCs chart. *Gateway 2000, 800/846-2000, 605/232-2000* **Reader service no. 692**

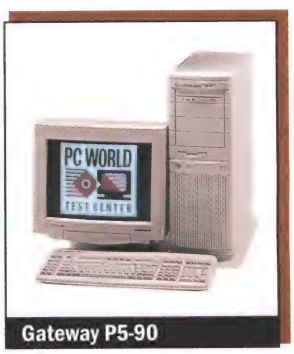
Gateway P5-90

PC WORLD TOP 20 4 POWER DESKTOP

PROS: Scorching performance, large monitor
CONS: Long hold times for tech support, no guaranteed turnaround time on service center repairs

The Gateway P5-90 is a titan of a PC. Nothing we've reviewed can beat this giant tower for sheer performance except the other 90-MHz Pentium in this roundup, Dell's Dimension XPS P90. Stocked with 16MB of RAM and 256K of secondary cache, the Gateway edged the Dell in the Windows tests except for Freelance, zipping through our Excel test three times faster than the median desktop. However, the P5-90 trailed the Dell in our DOS application tests, enough to tip the overall performance rating in favor of the Dimension.

The P5-90's components match its outstanding performance. The 2MB PCI video controller and 17-inch monitor will let you work comfortably all day at resolutions as high as 1280 by 1024, and even multimedia buffs should find the 540MB hard drive roomy enough.



Gateway P5-90

Expandability is predictably excellent. Even with the double-speed CD ROM drive and sound card, you have five free drive bays and six free expansion slots, including two PCI slots. The only fault here is that you'll have to discard RAM to go beyond 16MB. While most business users currently don't need more than 16MB, those who may want to move up to high-powered operating systems will find the P5-90 ideal except for the RAM limitation.

$4127 is a moderate price to pay for this outrageous amount of power. The biggest factor keeping the P5-90 from the top power desktop spot is Gateway's uneven service and support. Phone support available 18 hours a day (including 5 hours on Saturdays) and free on-site service are standouts, but the company doesn't offer a guaranteed turnaround time on service center repairs. Results from

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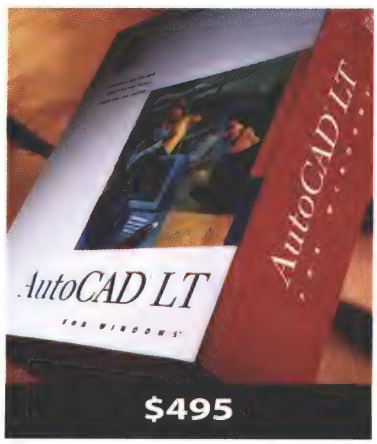
And one inexpensive one.



Autodesk.

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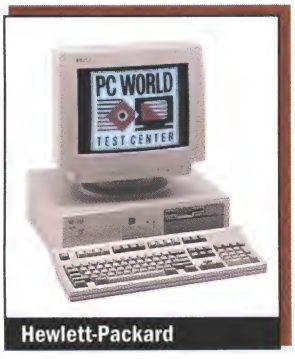
our Reliability and Service Monitor and our own anonymous calls show that Gateway technicians field customer questions well. Expect lengthy waits, however—our hold times averaged 10 minutes. Even with service-and-support snags, the P5-90 is an incredible performer and a solid power Best Buy. *Gateway 2000, 800/846-2000, 605/232-2000* **Reader service no. 693**

Hewlett-Packard Vectra VL2 4/100

PC WORLD TOP 20 19 POWER DESKTOP

PROS: Fast, three-year warranty, Energy Star compliant
CONS: SIMM sockets filled

Need more proof that a DX4-100 system can hobnob with the power PCs? With 8MB of RAM, this $2899 compact not only blew past the DX2-66s, it bested most of the Pentium-60s we've reviewed. Its 340MB hard drive is enough for most users, and HP made the most of a compact's meager expandability: Three drive bays are available, and the local bus video controller and hard drive adapter are built-in, leaving all four slots free.



Hewlett-Packard

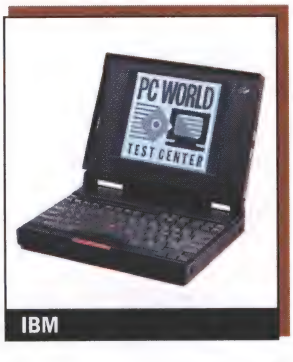
HP's support is exemplary. In addition to a three-year warranty and 24-hour tech support, the company boasts a minimal DOA and problem rate, according to HP users who responded to our Reliability and Service Monitor, and the majority of the small group of users who had PC troubles got satisfaction.

The Vectra VL2 4/100 could stand improvement in a few areas. It could use VL bus slots and a larger monitor, and the lack of free SIMM sockets means you'll have to discard RAM to go above 8MB. Still, this excellent performer backed by top-notch support earns a place in our Power Desktops Top 20. *Hewlett-Packard, 800/752-0900, 408/553-2922* **Reader service no. 694**

IBM ThinkPad 750P

PROS: Long battery life, many nice design features, excellent support
CONS: High price, a tad heavy

Not everyone needs the flexibility of a "convertible," but this version of the popular IBM ThinkPad caters to users who need to alternate between pen and keyboard input, such as a claims adjuster who pens a damage report one moment and types up a memo the next. The ThinkPad 750P's keyboard is unusually comfortable, and planted in its middle is a nub-shaped pointing device that's easy to use. The PCMCIA slot is common fare, but the business audio and 2.88MB floppy drive are rare extras. You'll appreciate the ability to hot swap the NiMH pack, remove the 170MB hard disk, and upgrade RAM all by lifting the keyboard. Plus you get a luxurious 5¾ hours of battery operation.



IBM

IBM earns kudos for its support. Its excellent policies include a three-year warranty and around-the-clock support, and reps answered our questions quickly and accurately. Responses to our Reliability and Service Monitor show problems with newer equipment, but the great majority of IBM customers got satisfaction.

The bottom line, however, is that you pay a steep $3749 for a mobile PC that lagged noticeably behind our comparison notebook. For the price, this 486SL-33–based ThinkPad needs more performance to break into our power mobile ranks. *IBM, 800/426-7735*

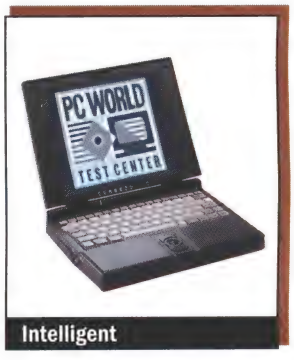
Intelligent EchoPad 486SX-25

PC WORLD TOP 20 10 BUDGET MOBILE PC

PROS: Small, low price, built-in sound
CONS: Poor performance, small hard drive

Need radical portability in a Windows-ready PC? You'll hardly notice the sub–6-pound EchoPad 486SX-25 in your carry-on as you trek between flight gates. Its low $1425 price also takes it easy on your wallet—enough to admit this subnotebook to our Budget Mobile PCs list.

With a computer this small, compromises are unavoidable. Keyboard keys are cramped, and the pointing device is a bit awkward to use. Another drawback is the short 2⅔-hour battery life. Slow speed is the most severe constraint—the system trailed our median notebook by over 60 percent in our test suite. Nonetheless, the EchoPad has features that are still rare on subnotes, such as built-in audio, a large 9½-inch passive mono screen, and a removable 125MB hard drive. The external floppy drive plugs into one of the two PCMCIA slots. And while Intelligent's support offering is a bit spare, especially its 9-hours-per-day and weekday-only phone support, we were able to reach tech reps quickly and received correct answers in all cases.



Intelligent

It's not for power seekers or the ham-handed, but this little PC has a lot going for it. If you have to think small in PC size and cost, put the EchoPad on your short list. *Intelligent Notebook Systems, 800/588-4674, 408/748-9781* **Reader service no. 695**

MicroSource Tempest Premier/PCI

PC WORLD TOP 20 14 BUDGET DESKTOP

PROS: Inexpensive for a Pentium-60
CONS: Case flexes, shoddy keyboard and mouse

Pentium-60 systems are feeling the heat from their Pentium-66 competitors, but $2375 is an alluring price for a Pentium-60, especially a PCI tower. In fact, the MicroSource Tempest Premier/PCI is the first Pentium-60 to break into our Top 20 chart for *budget* systems.

MicroSource cut a few corners to keep the price down. Several of this machine's components could be better: The Tempest Premier/PCI's monitor is a barely adequate 14 inches, and the mouse and keyboard feel cheap. The machine also has a few design glitches, such as a case that easily flexes and SIMM sockets hidden below the hard drive. Apart from these points, however, the system is

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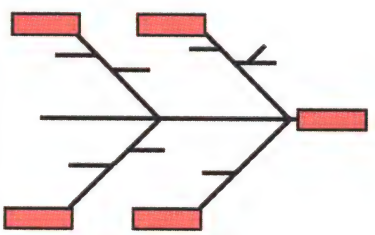

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PC MAGAZINE EDITORS' CHOICE December 21, 1993

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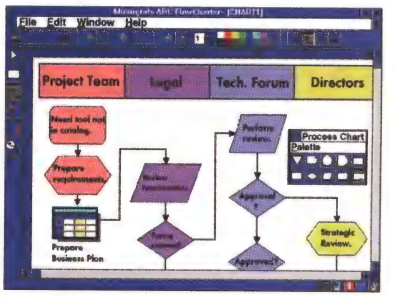

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so easy, the hardest thing to do could be deciding where to go for your nice, relaxing lunch.

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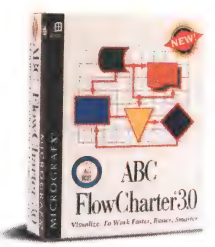

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- PC Magazine, December 21, 1993

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THE TOP 20

PC WORLD MOBILE PCs

1 Gateway ColorBook DX2-50
Smooth blend of power and price.

➤ New this month ◀ No change from last month
▲ Up from last month ▼ Down from last month

POWER SYSTEMS

		Last month	Months on list	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	➤ Gateway ColorBook DX2-50	–	1	91	33	62/82	$2995	486DX2-50	8	250
2	▼ Toshiba T4700CT 486 Notebook	1	4	91	35	80/78	$4549	486DX2-50	8	203
3	▼ TI TravelMate 4000E WinDX4/75	2	2	91	38	69/79	$4999	DX4-75	4	455
4	➤ NEC Versa 75EC	–	1	90	42	62/74	$5893	DX4-75	8	340
5	➤ Compaq Contura Aero 4/33C Model 170	–	1	89	28	83/89	$2448	486SX-33	8	171
6	▼ IBM ThinkPad 750C	3	4	89	33	75/83	$6003	486SL-33	12	170
7	➤ Gateway ColorBook DX2-40	–	1	88	27	62/82	$2764	486DX2-40	8	250
8	◀ Austin 466T	8	4	87	30	62/76	$4279	486DX2-66	8	340
9	▼ IBM ThinkPad 750Cs	4	2	87	25	75/83	$3899	486DX-33	4	170
10	➤ Acom VESA-4000	–	1	85	40	62/69	$4295	486DX2-66	16	328

BUDGET SYSTEMS

		Last month	Months on list	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	➤ Compaq Contura Aero 4/33C Model 170	–	1	93	28	83/89	$2448	486SX-33	8	171
2	▼ Compaq Concerto 4/33 Model 250	1	4	89	24	83/89	$2449	486SL-33	4	250
3	▼ Toshiba Portégé T3400	2	2	87	29	80/78	$2748	486SX-33	8	120
4	▼ ZDS Z-Lite 486-25	3	4	87	17	67/80	$1599	486SL-25	4	170
5	▲ WinBook 486SX/25 Color	8	3	86	23	62/69	$1999	486SX-25	8	200
6	▼ TI TravelMate 4000E WinSX/25 Color	4	2	85	19	69/79	$1800	486SX-25	4	129
7	▼ AST Bravo NB 4/33s	5	2	85	23	66/74	$2335	486SX-33	8	200
8	▼ Packard Bell Diplomat 170M	6	3	83	18	70/70	$1995	486SL-25	4	170
9	▼ Toshiba T4600	7	3	83	20	80/78	$1995	486SL-33	4	120
10	➤ Intelligent EchoPad 486SX-25	–	1	82	17	62/71	$1425	486SX-25	4	125

Best Buy

[1] CA = color active, CD = color dual-scan, CP = color passive, MP = mono passive.

[2] Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports ($4.95); a complete month's

2 Toshiba T4700CT 486 Notebook
Speed and features spell Best Buy.

1 Compaq Contura Aero 4/33C
Superb subnotebook flies.

2 Compaq Concerto 4/33 Model 250
Feature-packed pen notebook.

Weight (pounds)	Battery life (hours)	Screen type/size[1]	Vendor contact number	Issue reviewed	Fax reprint number[2]	Comments
7.2	4:29	CD/9.5"	800/846-2000	current	3635	Good performance, battery life, features; great price.
8.8	4:02	CA/9.5"	800/334-3445	Apr 94	3603	Fast all-rounder with built-in sound, excellent battery life, and great service and reliability.
8	3:02	CA/9.5"	800/527-3500	June 94	3625	Fast DX4-75 with huge hard drive is a touch behind Best Buy Toshiba.
8.4	3:20	CA/9.5"	800/632-4636	current	3636	One of the fastest notebooks we've tested to date: flexible design.
5	6:18	CP/7.8"	800/345-1518	current	3637	No. 1 budget subnote holds its own on Power list.
8.2	3:52	CA/10.5"	800/426-7735	Apr 94	3601	Past Best Buy power note with sharp screen and built-in sound. Price rose sharply this month.
7.2	4:50	CD/9.5"	800/846-2000	current	3638	Virtual twin of no. 1 Gateway is slightly slower and slightly cheaper.
7.8	3:30	CA/9.5"	800/443-7914	Apr 94	3604	Slow for a DX2-66 but still speedy; large hard drive.
8	4:31	CD/9.5"	800/426-7735	June 94	3626	Dual-scan version of the successful IBM power notebook.
9	2:21	CA/9.5"	800/898-2665	current	3639	Fast but has poor battery life.
5	6:18	CP/7.8"	800/345-1518	current	3637	New color subnote shoots to the top based on great all-around specs. Also on Power list.
8.2	6:31	MP/9.5"	800/345-1518	Apr 94	3602	Pen-based Compaq repeats as Best Buy. Battery life and features keep it near the top.
5.8	6:31	MP/8.5"	800/334-3445	June 94	3627	Fastest budget notebook. Subnote weight, long battery life.
6.2	4:16	MP/8.5"	800/553-0331	Apr 94	3612	Good all-around subnote at a lowball price.
7.8	3:01	CD/10.5"	800/468-2162	May 94	3634	Good value color notebook with decent speed.
8	4:40	CD/8.2"	800/527-3500	June 94	3630	Low-price color budget notebook is solid in all areas.
7.8	3:08	CD/9.5"	800/876-4278	June 94	3631	Decent color notebook held back a bit by price.
6.2	4:40	MP/8.5"	800/733-4411	May 94	3632	Physical twin of ZDS Z-Lite; falls behind on service.
8.2	5:02	MP/9.4"	800/334-3445	May 94	3633	Good all-around mono notebook at a decent price.
5.8	2:39	MP/9.5"	800/588-4674	current	3640	Supercheap mono subnote could use better performance and battery life.

review ($9.95 each; December 3012, January 3001, February 3002, March 3003, April 3004, May 3005, June 3006, July 3007); and a list of all systems tested by the PC World Test Center for the Top 20s ($4.95). Touch-tone phone required. Charges will appear on your telephone bill.

solid. The 8MB of RAM, 256K of secondary cache, and integrated 2MB PCI video controller all helped this budget PC provide respectable Pentium-60 performance, and the 341MB hard drive is well above the minimum size for Windows systems. Expandability is decent: You get six free drive bays (four externally accessible and two internal) and seven free expansion slots (a mix of PCI and ISA). Two of four SIMM sockets are free, allowing you to upgrade to 72MB of RAM without having to discard SIMMs. The motherboard is cleanly designed, all expansion slots are easily accessible, and a heat sink and minifan provide plenty of ventilation for the hot-running Pentium processor.

Apart from a long two-year warranty, MicroSource's service-and-

FEATURES COMPARISON: THIS MONTH'S CONTENDERS–MOBILE PCs

New Mobiles: Faster, Cheaper, Smaller

● Yes
○ No
n/a = not applicable

	Acom VESA-4000	BEST BUY Compaq Contura Aero 4/33C Model 170	BEST BUY Gateway ColorBook DX2-50	Gateway ColorBook DX2-40	IBM ThinkPad 750P	Intelligent EchoPad 486SX-25	NEC Versa 75EC
Standard features							
Selling price as of 4/15/94[1]	$4295	$2448	$2995	$2764	$3749	$1425	$5893
CPU	486DX2-66	486SX-33	486DX2-50	486DX2-40	486SL-33	486SX-25	DX4-75
Traveling weight (pounds)[2]	9	5	7.2	7.2	8.4	5.8[3]	8.4
Width x depth x height (inches)	11 x 8.6 x 2.1	10.3 x 7.4 x 1.7	11.7 x 8.5 x 1.8	11.7 x 8.5 x 1.8	11.7 x 8.3 x 2.1	10.4 x 7.8 x 1.4	11.7 x 9.3 x 2.1
Installed/maximum RAM (MB)	16/20	8/12	8/20	8/20	4/20	4/20	8/20
Secondary RAM cache installed/maximum (K)	128/128	0/0	0/0	0/0	0/0	0/0	0/0
Installed/maximum hard disk (MB)	328/540	171/250	250/250	250/250	170/170	125/260	340/340
Removable hard disk	○	○	●	●	●	●	●
Display type	color active	color passive	color dual-scan	color dual-scan	mono passive[4]	mono passive	color active
Screen diagonal (inches)	9.5	7.8	9.5	9.5	9.5	9.5	9.5
Maximum colors or gray shades of LCD	256 colors	256 colors	256 colors	256 colors	64 gray	64 gray	256 colors
Simultaneous LCD and external monitor	●	●	●	●	●	●	●
Highest resolution of external monitor	1024 x 768	800 x 600	1024 x 768	1024 x 768	1024 x 768	1024 x 768	1024 x 768
Mouse/keyboard ports	1/0[5]	0/0	1/0[5]	1/0[5]	1/0[5]	1/0[5]	1/1
Cursor keys in inverted T	●	●	●	●	●	●	●
Dedicated page control keys	●	○	●	●	●	○	●
All 12 function keys dedicated	●	○	●	●	●	○	●
Standard <Ctrl> and <Alt> layout	○	○	○	○	●	○	○
Built-in pointing device	●	●	●	●	●	●	●
Modem fax/data speed (kilobits per second)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Docking station available	●	●	○	○	●	○	●
PCMCIA slot Type II/III	0/1[6]	1/0	0/1[6]	0/1[6]	0/1[6]	0/1[6]	0/1[6]
Power management							
Supports APM	○	●	●	●	●	●	●
Type of battery	NiCd	NiMH	NiMH	NiMH	NiMH	NiCd[7]	NiMH
Suspend button	○	●	●[8]	●[8]	●[8]	●	●
Suspends when case closed	●	○	●	●	●	●	○
Service and support							
Warranty (years)	1	3	1	1	3	1	3
30-day money-back guarantee	●	●	●	●	●	●	●
On-site/replacement service price for first year	○	free	○	○	$40	$169[9]	free[10]
Turnaround policy (days at service center)	1	2	○	○	3	3	1
Daily toll-free phone support (hours)	11	24	18	18	24	9	24
Weekend support	○	●	●[11]	●[11]	●	○	●
BBS	●	●	●	●	●	●	●
Fax	○	●	●	●	●	●	●

[1] All notebooks priced as configured with DOS 6.0 or later, Windows 3.1, VGA monochrome or better display, mouse or other pointing device. Selling price is direct or based on vendor estimate.

[2] Includes computer, adapter, and power cord.

[3] 6.4 pounds with external floppy.

[4] Screen is pen sensitive.

[5] Mouse port doubles as keyboard port.

[6] Accepts two Type II devices.

[7] Optional NiMH pack available.

[8] Key combination.

[9] Three years of GE on-site service.

[10] Pickup and return within 24 hours.

[11] Saturdays only.

We Scan Corrected.

You expect a scanned image to accurately reflect the color found in your original. Getting there, however, is usually no picnic. After scanning, precious hours are often spent adjusting the image in software to capture the truest blue, a faithful fuchsia, or for example, just the right kind of red in a ripe watermelon. But DCR™ has changed all that.

Now, when you purchase the **new, low-priced ScanMaker® IIsp single-pass color scanner**, you also get **DCR, Dynamic Color Rendition**, an advanced, yet easy-to-use color calibration and correction system. DCR actually calibrates the ScanMaker IIsp to a photographic industry-accepted calibration target, creating a custom color profile of your specific scanner, ensuring the most accurate color possible as you scan the image. But don't take our word for it. Here's what *PC Magazine* said in their February 8, 1994 issue: "...this mechanism (DCR) seems to have worked well, because the ScanMaker IIsp's color output was clearly the best of any scanner in our survey."

So, even if you need to capture the bright yellow flesh of a Honeyheart watermelon, like the wedge on the left, the quickest way to do it is with the new ScanMaker IIsp with DCR.

For more information about the ScanMaker IIsp, DCR, your nearest authorized Microtek reseller, or a FREE copy of *The Scanned Image* — a scanning primer, call **1-800-654-4160** or fax (310) 297-5050.

The ScanMaker IIsp accurately captures millions of brilliant colors at resolutions up to 1200 x 1200 dpi through software interpolation (300 x 600 dpi optically). In addition to the DCR color calibration/correction system, the ScanMaker IIsp is bundled with ***Adobe Photoshop 2.5 LE*** *for either Windows or Macintosh. Windows users also get* ***Caere's PageKeeper Portfolio*** *document and image management software.*

PC MAGAZINE EDITORS' CHOICE
February 8, 1994
Microtek ScanMaker IISP

IMAGING MAGAZINE EDITORS' CHOICE

MICROTEK
Better Images Through Innovation.

The DCR color calibration / correction system is a proprietary system of Microtek Lab, Inc., The following are trademarks or registered trademarks of their respective companies: Microtek, ScanMaker and DCR (Dynamic Color Rendition) of Microtek Lab, Inc. Adobe Photoshop LE of Adobe Systems, Inc. PageKeeper Portfolio of Caere Corporation. SMIISP294

Circle 195 on reader service card

FEATURES COMPARISON: THIS MONTH'S CONTENDERS—DESKTOPS

Pentium-60s Are in Their Prime

● Yes
○ No
n/a = not applicable

	AcerPower 9000T	ALR Evolution IV 4/100	Ambra T466i/VL	AST Premmia LX P/60	BEST BUY ATronics PCI Emerald	Compaq Deskpro XE 560 Model 525/w	BEST BUY Dell Dimension XPS P90	BEST BUY Gateway P5-90
Standard features								
Selling price as of 4/15/94[1]	$3695	$2919	$2808	$4138	$1995	$4216	$3999	$4127
CPU	Pentium-60	DX4-100	486DX2-66	Pentium-60	486DX2-66	Pentium-60	Pentium-90	Pentium-90
CPU/upgrade socket	273-pin ZIF	238-pin ZIF	238-pin	273-pin ZIF	238-pin ZIF	273-pin	273-pin ZIF	273-pin ZIF
BIOS	Acer 1.2 R1.1	Phoenix 4/19/90	Phoenix 2/16/94	AMI 1/26/94	AMI 8/8/93	Compaq 9/28/93	AMI 11/11/92	AMI 1.00.04AX1
Installed/maximum RAM (MB)	8/192	8/52	16/64	16/128	8/128	8/136	16/128	16/128
30-pin or 72-pin SIMMs	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin
SIMM sockets/number free	6/4	3/2	4/0	4/2	4/2	4/4	4/2	4/0
Secondary RAM cache installed/maximum (K)	256/512	256/256	256/256	256/256	256/512	256/256	256/256	256/256
Case style	tower	compact	minitower	desktop	compact	compact	compact	tower
Free externally accessible 3½-inch/5¼-inch drive bays	1/2	0/2	1/2	0/2	1/2	0/1	0/1	0/3
Free internal 3½-inch/5¼-inch drive bays	1/0	2/0	1/0	0/0	0/0	0/0	1/0	2/0
Free 32-bit EISA/16-bit ISA/8-bit ISA expansion slots	0/4/0[2]	0/4/0	0/7/0	0/3/0	0/5/0[2]	0/3/0	0/4/0[2]	0/4/0[2]
PCI or VL bus slots/number free[3]	3 PCI/2[4]	2 VLB/1	1 VLB/1	2 PCI/2	4 PCI/2[4]	0/0	3 PCI/2[4]	3 PCI/2[4]
Hard disk	Quantum Pro-Drive 540A	WD Caviar 2420	WD AC2540	Quantum Pro-Drive 540A	WD Caviar 2250	Quantum Pro-Drive 540A	Conner CFA1080A	WD Caviar 2540
Size (MB)	540	425	540	540	256	525	1080	540
Adapter	integrated	integrated	integrated	integrated PCI	ATronics IDEal PCI	integrated	integrated	integrated
Floppy drives (MB)	1.44	1.44	1.44	1.44	1.2, 1.44	1.44	1.44	1.44
Graphics adapter	Acer 688 Graphics	Western Digital Paradise	integrated	integrated	Diamond Viper PCI	integrated	#9GXE 64 Pro PCI Local Bus	Matrox MGA Power Graphics
Installed VRAM/DRAM (MB)	0/2	0/1	0/2	2/0	2/0	1/0	4/0	2/0
Monitor	AcerView 76i	ALR ClearView 15	Ambra	AST Vision 5L	CTX 1451	Compaq 151FS	Dell 15VS	Gateway Crystal-Scan 1776 LE
Screen diagonal (inches)/dot pitch (mm)	17/.28	15/.28	15/.28	15/.28	14/.28	15/.28	15/.28	17/.26
Modem fax/data speed (kbps)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sound board	Creative Labs SoundBlaster	○	○	○	○	integrated Business Audio	Creative Labs SoundBlaster 16	Gateway 2000 OEM
CD ROM drive	Panasonic OEM CR-563-B	○	○	○	○	○	OEM CRG-BTB-3	NEC CDR-260
Data transfer rate (K/sec)	300	n/a	n/a	n/a	n/a	n/a	300	300
Parallel/serial/mouse/SCSI ports	1/2/1/0	1/2/1/0	1/2/1/0	1/2/1/0	1/2/0/0	1/1/1/0	1/2/1/0	1/2/1/0
Service and support								
Warranty (years)	1	5/1.25[5]	1	3	1	3	1	1
30-day money-back guarantee	●	●	●	○	●	○	●	●
On-site service first-year price	free	$9.95	$29	free	$69	free	free	free
Service center turnaround (days)	3	3	7	2	3	2	○	○
Daily toll-free phone support (hours)	24	12	24	24	9	24	24	18
Weekend support	●	●[7]	●	●	○	●	●	●[7]
BBS	●	●	○	●	●	●	●	●
Fax	●	●	○	●	●	●	●	●

[1] All systems priced as configured with DOS 6.0 or later, Windows 3.1, VGA and color monitor, keyboard, and mouse or other pointing device. Selling price is direct or based on vendor estimate.

[2] One less ISA slot available when all PCI slots are filled.

[3] VL slots also accept 16-bit ISA peripherals.

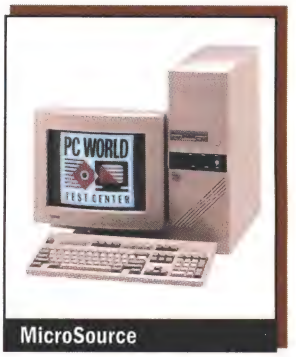
[4] One less PCI slot available when all ISA slots are filled.

[5] Five years parts, 15 months labor.

	HP Vectra VL2 4/100	MicroSource Tempest Premier/PCI	MidWest Micro 486DX2-66	Packard Bell Pentium Computer	Tangent Pentium P560
	$2899	$2375	$1899	$3000	$3349
	DX4-100	Pentium-60	AMD 486DX2-66	Pentium-60	Pentium-60
	168-pin	273-pin ZIF	237-pin ZIF	273-pin ZIF	273-pin ZIF
	Phoenix 2/17/94	AMI 1/26/94	AMI 4/4/93	AMI 12/8/93	AMI 11/30/93
	8/64	8/128	8/64	8/128	8/128
	72-pin	72-pin	30-pin	72-pin	72-pin
	2/0	4/2	8/0	4/2	4/2
	256/256	256/256	128/256	256/256	256/256
	compact	tower	tower	compact	compact
	0/1	1/3	1/2	0/2	0/2
	0/2	1/1	2/0	0/0	2/0
	0/4/0	0/5/0[2]	0/2/2	0/2/0[2]	0/5/0[2]
	0/0	3 PCI/2[4]	3 VLB/1	2 PCI/2[4]	3 PCI/1[4]
	Quantum Pro-Drive 340	WD WDAC 2340-00H	Seagate ST3385A	WD Caviar 2420	Seagate ST3390N
	340	341	341	420	343
	integrated	integrated	OEM MI3210V	integrated	NexStor NXT93
	1.44	1.44	1.44	1.44	combo
	integrated	TopVGA 2100L	OEM CL542x VGA	integrated	Diamond Viper PCI
	0/1	0/2	0/1	1/0	2/0
	HP SuperVGA 2804A	Tystar TY3448	InfoTel SRC1501	PB 8517MG	CTX CMS 1461
	14/.28	14/.28	15/.28	17/.28	14/.28
	n/a	n/a	n/a	14.4/14.4	n/a
	○	○	○	○	○
	○	○	Matsushita CR-562-B	○	○
	n/a	n/a	300	n/a	n/a
	1/2/1/0	2/1/0/0	1/2/0/0	1/2/1/0	1/2/0/1
	3	2	3	1	1/3[6]
	○	●	●	○	●
	free	$75	○	free	free
	3	3	○	2	2
	24	9	11	24	11
	●	●[7]	●[7]	●	●[7]
	●	○	●	●	●
	●	●	●	●	●

[6] One year parts, three years labor.
[7] Saturdays only.

support policies are middle-of-the-road. Our anonymous calls to tech support got through in under 2 minutes on average, but the reps missed our toughest question.



MicroSource

With MicroSource's latest Tempest, you get a lot of PC for the money—enough to secure it a place on our Budget Desktops Top 20. If you opt for a 15-inch monitor and higher-quality keyboard and mouse, you'll get an all-around power system at a near-budget-system price. *MicroSource, 800/848-5161, 818/858-5161* **Reader service no. 696**

MidWest Micro 486DX2-66

PC WORLD TOP 20
7 BUDGET DESKTOP

PROS: Low price for a DX2-66–level multimedia PC, three-year warranty, good tech support
CONS: Have to discard SIMMs to upgrade RAM

MidWest Micro sure knows how to make an impression: This company debuts in our review pages with an $1899 DX2-66 tower that needs only a 16-bit sound card to be a full multimedia system. And while "DX2-66" in this case refers to AMD's 486DX2-66 processor—which is found in only a few desktops—this CPU plus 8MB of RAM and 128K of secondary cache provided performance roughly equal to that of our median Intel DX2-66. This isn't surprising, since AMD's CPU has a spec similar to that of its Intel counterpart. You get so much for your money, the MidWest Micro 486DX2-66 falls just two places short of being a budget desktop Best Buy.

MidWest Micro

Given such a low price, we were surprised to find only one major drawback: All the older 30-pin SIMM sockets are filled, which means that you have to discard memory if you want to upgrade beyond 8MB. This aside, expandability and components are quite sufficient. You get one VL bus and four ISA slots free, as well as five free drive bays, three of which are externally accessible. And you get a 341MB hard drive, a double-speed CD ROM drive, a business audio expansion board, and a 15-inch monitor that's nicely complemented by the 1MB VL bus video adapter.

MidWest Micro wraps up its generous package with a mostly favorable service-and-support policy. The company offers neither an on-site service option nor a guaranteed turnaround time on service center repairs, but it does provide a three-year warranty and 11 hours of phone support per day including Saturdays. Tech support is on the ball: Reps picked up our anonymous calls in under 2 minutes and answered all questions correctly.

Overall, the 486DX2-66 is one of the best DX2-66–level systems you can find for under $2000, and it's one of the first PCs you should look at if you want to put together a budget multimedia computer. *MidWest Micro, 800/728-8582* **Reader service no. 697**

The course of computing is hereby changed.

From the old.

*(Actual size.)**

The chip on the left is getting a little old.

Its 15-year-old technology has been pushed to the limit. It worked well enough for yesterday's character-based computers, but it's having a hard time keeping up with the demands of today's computers and software.

The new PowerPC™ microprocessor from Motorola, however, is just getting started.

It's based on advanced RISC (reduced instruction set computing) technology, the technology most experts agree is the only way to reach the performance levels required by the new generation of computers and software.

Taking full advantage of its RISC technology, the Motorola PowerPC microprocessor runs

The PowerPC Microprocessor. *The RISC Chip.*

*Both chips shown actual size. ©1994 Motorola, Inc. The Powered by Motorola logo is a trademark and Motorola and the Ⓜ are registered trademarks of Motorola, Inc. PowerPC and the PowerPC logo are trademarks of IBM Corp. and are used by

To the new.

(Smaller, cooler, faster, cheaper.)

faster, runs cooler, occupies less space and consumes less power. Surprisingly, it costs considerably less than the chip on the left.

POWERED BY MOTOROLA

The first computers based on the PowerPC microprocessor are now arriving. Apple's awesome new Power Macintosh™ computers are here. Potent PowerPC personal computers from IBM® are on the way. Computers powered by the chip on the left, it seems, are on the way out.

See the Power Macintosh at your reseller today. Or for a free copy of our PowerPC Microprocessor Update, call 1-800-845-MOTO (in Europe, 0272 447760). Either way, you'll see a change for the better.

MOTOROLA

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NEC Versa 75EC

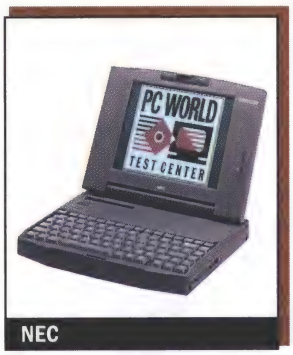
PC WORLD TOP 20 4 POWER MOBILE PC

PROS: Blazing speed, beautiful color display, well designed

CONS: Very pricey

Here's NEC's latest and most agile entry in its Versa E line of notebooks. Built around a 75-MHz DX4 processor, this screamer is the third-fastest notebook we've ever had on the test bench, assuring the Versa 75EC a spot on our Power Mobile PCs chart.

Searing speed is just one part of the Versa's success story. This notebook benefits from outstanding design, from its snazzy 9½-inch color screen and handsome, solidly built chassis to its compact AC adapter. The unit's low-power 3.3-volt design helped extend battery life; the Versa ran 3⅓ hours in our rundown test. The keyboard is particularly easy to get around on, and, while the trackball and mouse keys appear to be awkwardly placed on the notebook's front panel, they prove surprisingly comfortable to use. In addition, the Versa has a flexible modular design—the 340MB hard disk, floppy drive, and screen can all be removed by the user—and the system comes with a pair of PCMCIA sockets. Looking for a great portable for giving presentations? The Versa's 1MB of video RAM lets you display rich 256-color images at 1024 by 768 resolution on an external monitor.



NEC

Our ongoing survey of *PC World* readers turns up mixed results for NEC's support. The company drew a slightly higher-than-average percentage of NEC notebook buyers complaining of DOA products, but it also enjoys some of the highest customer satisfaction ratings with regard to resolving problems. NEC's three-year warranty, 24-hour toll-free tech support, and one-day turnaround time on service center repairs are excellent.

Bargain hunters won't clamor for the $5893 Versa, but its terrific performance, active-matrix screen, and polished design will woo many demanding road warriors. These features help make it our fourth most highly recommended power mobile PC. *NEC Technologies, 800/632-4636, 508/635-8000* **Reader service no. 698**

Packard Bell Pentium Computer

PC WORLD TOP 20 15 POWER DESKTOP

PROS: Excellent setup utility, large monitor

CONS: Below-average service and support

Packard Bell's latest system will appeal to business and home PC buyers alike. The Pentium Computer has some great components, including a 420MB hard disk and a 17-inch monitor. The preinstalled Navigator software offers tutorials on using the computer and Windows, as well as a desktop from which you can launch programs and assign an access password to each. The Pentium Computer also comes equipped with a 14.4/14.4-kbps fax-modem card that lets you quickly roam around the world of online services. Finally, the PC's Pentium-60 power and onboard video processor are suited for running educational and entertainment programs that use digital video. We had hoped for a little more performance from a system of this CPU class, but it does all right where it counts: although the Pentium Computer faltered significantly in the DOS applications, trailing its peers by as much as a third, its performance was about average for a Pentium-60 desktop in our Windows tests.

System design is impressive, from a no-flex case and motherboard to easy-access slots and memory sockets. Expandability isn't bad either, especially for a compact. Two open sockets let you add all the RAM you'll probably ever need without discarding SIMMs, and you have two drive bays and four expansion slots at your disposal. Packard Bell stumbles a bit, however, on service and support. Its around-the-clock support (including on weekends) is a major plus, but all other policies are standard, and reps kept us on hold for 6 minutes on average. Furthermore, they answered our toughest question incorrectly.

Packard Bell

Packard Bell could have made its PC even more attractive for the home and business markets by including a smaller 15-inch monitor and applying the cost savings toward a CD ROM drive. Still, the Pentium Computer is a solid Pentium-60 system, and it's a good deal at $3000 when you consider all the high-end peripherals. That's why it makes the Power Desktops Top 20. *Packard Bell, 800/733-4411* **Reader service no. 699**

Tangent Pentium P560

PROS: Good service and support, expandability

CONS: Expensive

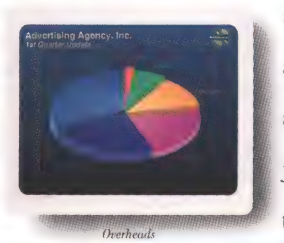
Tangent's Pentium P560 joins the growing ranks of Pentium-60 systems. This solidly built machine is stocked with 8MB of RAM and 256K of secondary cache. It turns in a typical performance for its peer group, although it did exceptionally well in Word for Windows and exceptionally poorly in Paradox for Windows. The Pentium P560 has decent expandability for a compact: You get four free bays, six free slots, and lots of RAM upgradability. Tangent also provides respectable service and support, including free onsite service and Saturday support hours. Tech reps answered the phone promptly and answered our questions correctly.

Tangent

However, the Pentium P560 falls short of the competition. The $3349 system is pricey, and you pay extra for a couple of components you can't fully exploit: Much of the 2MB VRAM-equipped PCI graphics accelerator—one of the fastest on the market—is wasted on the small 14-inch monitor, and the PCI-based SCSI disk controller is overkill for the 343MB hard drive. The upshot: You can get more PC for your money elsewhere. *Tangent Computer, 800/800-5550* **Reader service no. 700**

Science has found a cure for snoring. At least during your presentation.

It's the new Phaser™ 220 color printer by Tektronix®. It's affordable. It's easy to use. And it's the best way to keep people awake without the use of costly stimulants. How? Quite simply, amazing color. The Phaser 220's SuperCell 600™ technology allows you to print a whopping 600 x 300 dots-per-inch. And in lay terms, that's a lotta dots. And a lotta dots means your annual reports will yodel, your pie charts will do backflips and your bar graphs will announce their presence with authority. Plus you get all this great color at two pages per minute on most common laser papers. At this speed, it should come with an airbag. The Phaser 220 also offers true Adobe® PostScript™ Level 2 and supports PCs, Macs, workstations and just about every network interconnect. Add to this the fact that it's reliable, has multiple paper trays and a huge print capacity and you've got yourself one tough workhorse. For a free Phaser 220 print sample or the name of your nearest Tektronix dealer, call **800-835-6100**, department 34I. For faxed information, call 503-682-7450, and ask for document #5003. But don't wait too long. Because business is getting more and more competitive. And if you snooze, you lose.



Overheads

Desktop Publishing

Reports

The Phaser 200 series starts at a suggested retail price of only $2,995. Who says money can't buy happiness?

Tektronix

Phaser is a trademark of Tektronix, Inc. PostScript is a trademark of Adobe Systems, Inc. All other marks are trademarks or registered trademarks of their respective companies.

Circle 124 on reader service card

System Snapshots

These systems, while capable, don't match the preceding group for overall value in a business environment. However, many of them present unique and valuable solutions to end-user needs.

Alaris Leopard EnergySmartPC SLC2/66

PROS: Inexpensive, Energy Star compliant
CONS: Slow, poor support policies

Alaris made its entrance into the PC biz with enticingly priced Energy Star systems, including this $1699 compact. But don't be fooled by the "66" in its name: Its IBM 486SLC2-66 CPU shovels data to the motherboard only half as fast as the Intel DX2-66. Because of that and its scant 4MB of RAM, it yielded DX-33–level performance. The 250MB hard drive and 14-inch monitor are just adequate, and upgradability is a mixed bag. You get two bays and five slots free, but you can go up to only 12MB of RAM before you have to discard SIMMs. Alaris flopped in service and support, reciting a litany of no's to our questions: no toll-free support, no on-site service, no weekend hours, not even a money-back guarantee. Budget PC seekers can find a DX2-66 PC for a little more money elsewhere. *Alaris, 510/770-5700* **Reader service no. 701**

Austin Genesis 486DX-33

PROS: Inexpensive, Energy Star compliant
CONS: Slow

A bargain-basement $1499 tag makes the Genesis the review's price leader. But with a DX-33 CPU and just 4MB of RAM, this compact was twice as slow as our median desktop. It's also minimally configured with a 256MB hard drive, a 14-inch monitor, and a 512K video card. You can pump more life into the Genesis—a free SIMM socket lets you boost memory to 20MB without pulling the original module, and you get five free slots and two free drive bays. Genesis also offers good support policies, and its tech reps are on the ball.

Unfortunately, this PC's good points don't offset its slow performance. For a little more money, you can buy a good starter DX2-66 system. *Austin Computer Systems, 800/752-1577* **Reader service no. 702**

Micron P60PCI PowerStation

PROS: Gigantic hard drive, tons of RAM, good expandability, excellent service and support
CONS: Extremely expensive

Micron's mighty $6979 tower is one of the priciest computers we've ever written up, but it's decked out with a whopping 64MB of RAM and 2GB of hard drive—perfect for folks heavily into imaging, major database work, and other tasks that reap huge benefits from huge RAM disks and hard disks. Other pluses of this well-designed system include a 17-inch monitor and PCI video card, a CD ROM drive, great expandability, and exceptional service and support.

However, chances are you simply don't need all this silicon—most business software makes little use of RAM beyond 16MB. This Pentium-60 completed our tests only a tad more briskly than its peers. The P60PCI PowerStation is a solid performer with lots of extras, but why pay for what you don't use? *Micron, 800/438-3343* **Reader service no. 703**

MIS M466 PCI

PROS: Outstanding expandability for a compact
CONS: Expensive, mostly bare-bones components

MIS's DX2-66 contender has great expandability for a compact—you'll likely never have to discard SIMMs to add memory, and you get eight free slots. Unfortunately, the fast 2MB PCI video card is largely wasted on the small 14-inch monitor, and the 213MB hard drive is barely adequate. And even with 8MB of RAM, it provided subpar performance for this CPU class. Support is decent, with standard policies and responsive and well-trained reps. Even so, the $2800 M466 PCI is a budget system with a power price. You can find several well-configured DX2-66 PCI systems on the Budget Top 20 for much less. *MIS, 800/733-9188* **Reader service no. 704**

Solmicro Arena iV466

PROS: Low-cost multimedia PC, disk cache
CONS: Poor performance and expandability, no toll-free support

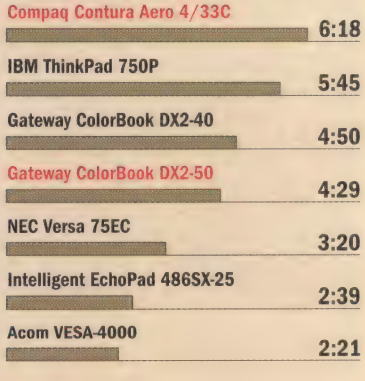
Solmicro makes a dramatic debut onto the personal computer stage—few companies offer a full DX2-66 multimedia system with fax-modem for as little as $2199.

Skeptics may ask where Solmicro cut corners, and rightly so. The Arena iV466's 250MB hard drive and 14-inch monitor are barely adequate for today's Windows PCs. The skimpy amount of RAM (4MB) is the main culprit behind this unit's pokey performance. Even with a local bus graphics controller, a 2MB hard drive controller, and a full secondary cache, this compact was nearly a third slower than our median DX2-66. Solmicro also saved a few pennies by using 30-pin SIMM sockets. Though these constrict RAM upgradability, you can expand memory to 20MB before you have to replace original SIMMs. However, only three ISA slots are free, and all three open drive bays are internal. The iV466 is further hindered by a weak support package. Solmicro furnishes the basics but lacks a toll-free line. Reps took our anonymous calls right away but missed our hardest question.

Solmicro delivers a true budget multimedia PC. However, it's slow, has limited expandability, and comes with subpar support—all of which make the iV466 fall far short of our Budget Desktops Top 20. *Solmicro, 510/656-5440* **Reader service no. 705**

BATTERY LIFE TEST REPORT

Compaq's Aero Flies the Farthest Nonstop



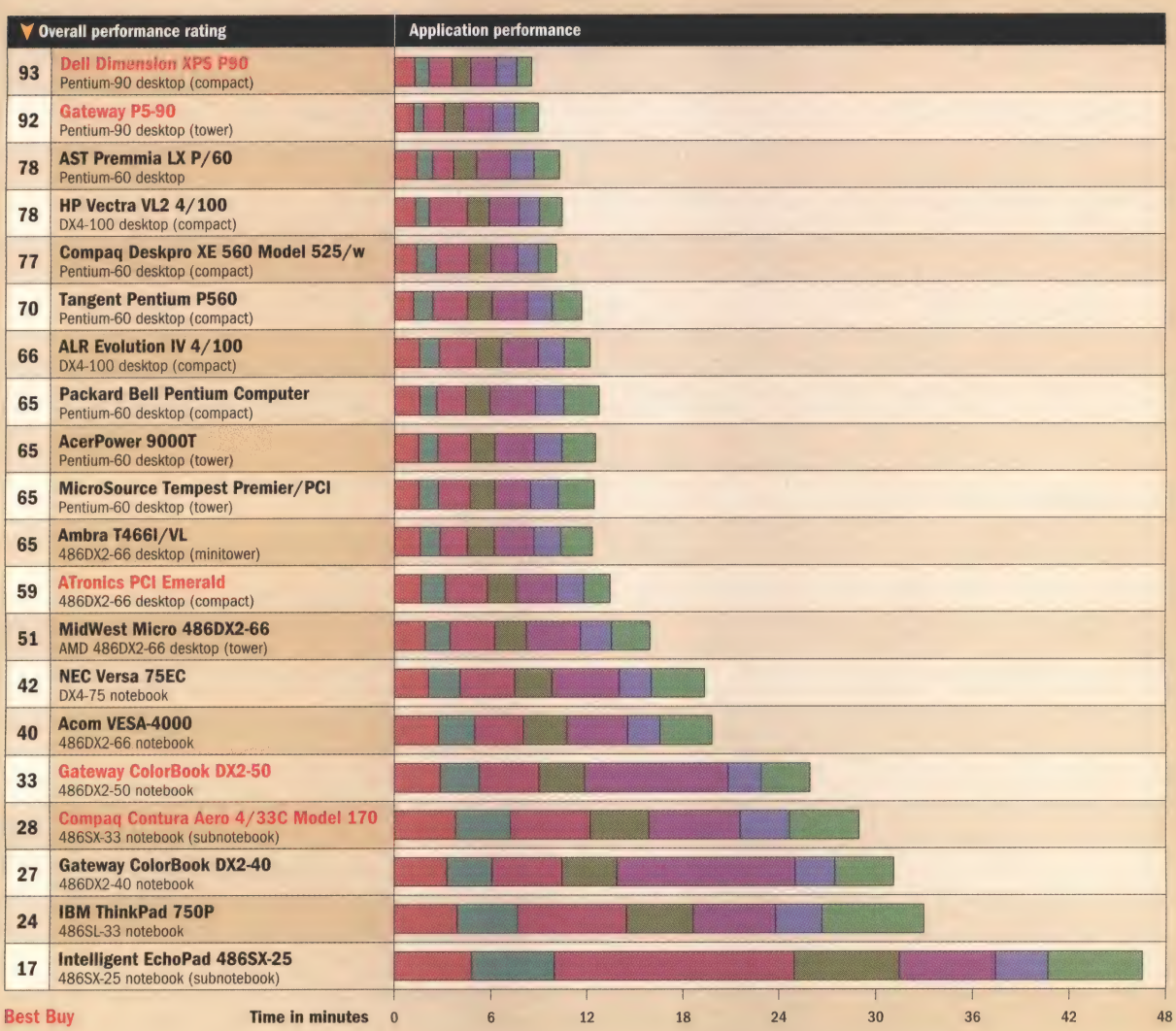
Best Buy

Time in hours:minutes.

Methodology
We drain and fully recharge the battery and set power-saving options to match a consistent profile where possible. Office workers type at regular intervals in Word for Windows, saving periodically. Notebooks are rotated among workers to even the work loads. We report the time elapsed until the notebook shuts itself off.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

Dell, Gateway Pentium-90s Break Away From the Pack



Machines ordered by overall performance from best to worst. The overall performance rating is a normalized, weighted average of all our performance tests.

Methodology

We tested each system as supplied by the manufacturer. We configured Windows with an HP LaserJet III as the default printer, disabled Print Manager, and attached a null printer to LPT1. We set video resolution to 800 by 600 pixels in 256 colors, using the supplied video driver where possible. We loaded the test applications and files and test automation software and scripts.

Word 2.0 for Windows

We worked with 1-, 9-, and 28-page business documents. Operations included creating, saving, opening, scrolling, editing, checking spelling, formatting, previewing, and printing.

Excel 4.0

We opened a file and performed several data extracts, entered new data, altered calculations, formatted, scrolled, moved blocks, previewed, printed, and saved.

Paradox 1.0 for Windows

We used a custom form to add a number of records to an existing table, performed several queries, and generated a report.

Freelance 1.0 for Windows

We built a six-page presentation using a standard template, clip art, text, and charts; applied several views to the presentation; and previewed and saved it.

WordPerfect 6.0 for DOS

We performed a variety of editing, formatting, previewing, and printing tasks on documents ranging from a single-page memo to a long report. Due to memory requirements, the amount of free memory for DOS in the first 640K dramatically affects this test.

1-2-3 release 3.4 for DOS

Using the graphical Wysiwyg add-in and working in three different files, we created and altered formulas, built graphs, saved, and printed.

Paradox 3.5 for DOS

We tested Paradox 3.5 running under Windows in a DOS window. We entered data, searched records, updated, and generated reports from a simple customer list.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

Win a Gateway P4D-66

Have you ever contacted your PC maker for service and support? Or has your PC been trouble-free? Tell us about it! Fill out and fax in the questionnaire below—even if you have no problems to report, and even if you have responded to this survey before—and we'll enter you in a drawing to win a Gateway P4D-66, a Best Buy 486DX2-66 featured in this month's PC World Top 20.

HOW TO ENTER: Fax your completed questionnaire to *PC World* at 415/974-7367. If you have trouble connecting to this number, fax your survey to 415/974-7404 or 415/442-1891. Do NOT fax a cover page. If you don't have a fax machine, you can mail your survey to Fax Survey, Box 7-SS, *PC World,* 501 Second St. #600, San Francisco, CA 94107-1496. Send your survey in no later than July 31.

HOW TO FILL OUT THE FORM: Clearly print your name (use block capital letters) and your fax number at right; fill the appropriate circle for each digit of your daytime phone number. Then fill out the rest of the questionnaire. WHEN FILLING THE CIRCLES, AVOID GOING OUTSIDE THE LINES! One entry per person per month. Void where prohibited by law.

LAST, FIRST NAME

FAX NUMBER — —

ZIP CODE

Please fill in your daytime phone number below.

1 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
2 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
3 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
4 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
5 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
6 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
7 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
8 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
9 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○
0 ○ ○ ○ ○ ○ ○ ○ ○ ○ ○

ABOUT YOUR PC

Who is the manufacturer of the PC you use most frequently?

- ○ Acer
- ○ Acma
- ○ ALR
- ○ Ambra
- ○ Ares
- ○ AST
- ○ AT&T (NCR)
- ○ ATronics
- ○ Austin
- ○ Axik
- ○ Blackship
- ○ CAF
- ○ Canon
- ○ Compaq
- ○ CompuAdd
- ○ Compudyne
- ○ Comtrade
- ○ DEC
- ○ Dell
- ○ Diamond
- ○ DTK
- ○ Dual
- ○ Eltech
- ○ Epson
- ○ Ergo
- ○ Everex
- ○ Gateway 2000
- ○ Hertz
- ○ Hewlett-Packard
- ○ Hyundai
- ○ IBM
- ○ Image
- ○ Inmac
- ○ Intelligent
- ○ Insight
- ○ Leading Edge
- ○ Micro Express
- ○ Micron
- ○ Microsource
- ○ Midwest Micro
- ○ MIS
- ○ Mitac
- ○ NEC
- ○ National Micro
- ○ Netis
- ○ Northgate
- ○ Packard Bell
- ○ Panasonic
- ○ PC Brand
- ○ Pionex
- ○ Polywell
- ○ Quantex
- ○ Samsung
- ○ Other (Specify first 7 letters)
- ○ Sharp
- ○ Shasta
- ○ Swan
- ○ Tagram
- ○ Tandy
- ○ Tangent
- ○ Texas Instruments
- ○ Toshiba
- ○ Tri-Star
- ○ USA Flex
- ○ VTech (Expotech, Laser)
- ○ Winbook
- ○ Zenith
- ○ Zeos
- ○ No-name clone

Is this PC a...?

- ○ Desktop
- ○ Notebook/laptop
- ○ Hand-held

Is the CPU a...?

- ○ Pentium
- ○ 80486
- ○ 80386
- ○ 80286
- ○ Other (specify): _____

Where did you buy this PC?

- ○ Local dealer
- ○ Mail/phone order
- ○ Direct from field sales force
- ○ Membership discount store
- ○ Computer superstore
- ○ Home/electronics store
- ○ Retail store
- ○ VAR
- ○ Other (specify): _____

When did you buy this PC?

- ○ This month
- ○ 1–3 months ago
- ○ 4–6 months ago
- ○ 7–12 months ago
- ○ More than 12 months ago
- ○ Not sure

Would you buy this brand of PC again?

- ○ Yes
- ○ No

If you bought your PC by mail or phone, how long after you ordered it did it arrive?

○ Less than 1 week ○ 1–2 weeks ○ 3–4 weeks ○ More than 4 weeks

WHAT ARE YOU REPORTING? (Check only one.)

- ○ No problems ever
- ○ No problems since last responded to survey
- ○ A problem since last responded to survey
- ○ An older problem not previously reported in survey

If you're NOT reporting a problem, please fill out the Uptime Report (below).

To REPORT a problem, fill out the Problem Report (right column).

UPTIME REPORT

How many consecutive months has your PC been trouble-free?

○ 3 months ○ 6 months ○ 9 months ○ 12 months ○ 15 months ○ 18 months ○ More than 18 months

■ **STOP HERE if you're not reporting a problem.**

PROBLEM REPORT

When you first received your NEW PC, was any component "dead on arrival"?

○ Yes ○ No ○ Don't know

If so, which one was it? (Check all that apply.)

- ○ Battery
- ○ CD ROM
- ○ CPU
- ○ Floppy drive
- ○ Graphics/video board
- ○ Hard drive
- ○ Keyboard
- ○ Memory
- ○ Modem/fax board
- ○ Monitor/screen
- ○ Motherboard
- ○ Mouse
- ○ Power supply
- ○ Sound board
- ○ Other

■ **For the following questions, describe your most recent HARDWARE-related problem with this PC.**

Did you contact the manufacturer for repair service or technical support?

- ○ Yes
- ○ No
- ○ Not sure

What was this problem finally identified as?

- ○ Faulty component
- ○ Incorrectly installed software
- ○ Wrong configuration
- ○ Faulty peripheral
- ○ Device conflicts
- ○ OS problem
- ○ Other
- ○ Don't know

If a component failed, which one was it? (Check all that apply.)

- ○ Battery
- ○ CD ROM
- ○ CPU
- ○ Floppy drive
- ○ Graphics/video board
- ○ Hard drive
- ○ Keyboard
- ○ Memory
- ○ Modem/fax board
- ○ Monitor/screen
- ○ Motherboard
- ○ Mouse
- ○ Power supply
- ○ Sound board
- ○ Other

How many times have you had a problem with this PC?

- ○ This was first time
- ○ Two
- ○ Three
- ○ Four
- ○ More than four

How recently did this problem occur?

- ○ This month
- ○ 1–3 months ago
- ○ 4–6 months ago
- ○ 7–12 months ago
- ○ More than 12 months ago
- ○ Not sure

How long after PURCHASE did this problem occur?

- ○ Less than 1 month
- ○ 1–3 months
- ○ 4–6 months
- ○ 7–12 months
- ○ More than 12 months
- ○ Not sure

Did the problem occur under warranty?

- ○ Yes
- ○ No
- ○ Not sure

■ **For the following questions, describe your most recent SERVICE or SUPPORT experience.**

What type of service/support did you receive?

- ○ Phone
- ○ On-site
- ○ In-store help
- ○ Express system swap
- ○ Express component swap
- ○ Factory return

If phone service, how long were you on hold?

- ○ Not at all
- ○ Less than 1 min.
- ○ 1–2 min.
- ○ 2–5 min.
- ○ 5–10 min.
- ○ 10–20 min.
- ○ More than 20 min.

How long did it take before you talked to the person who finally helped you?

- ○ Less than 1 hour
- ○ 1–24 hours
- ○ 1–2 days
- ○ 3–5 days
- ○ 1 week
- ○ More than 1 week

How long did it take to resolve the problem completely?

- ○ Less than 1 week
- ○ 1–2 weeks
- ○ 3–4 weeks
- ○ More than 1 month
- ○ Never resolved

Was the problem resolved to your satisfaction?

○ Yes ○ No

Based on the service and support you received, would you buy this brand of PC again?

○ Yes ○ No

On the whole, how satisfied were you with the service and support you received?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Not at all — Satisfied — Extremely satisfied

How likely is it that you would recommend this brand of PC to a friend or colleague?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Not at all — Likely — Extremely likely

PLEASE FAX TO 415/974-7367

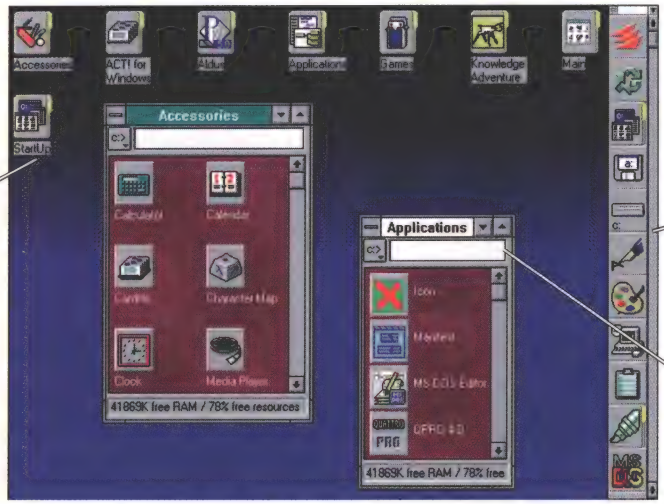
WONK

SideBar Wonks Your Windows to Perfection

SideBar eliminates the last bit of DOS clunkiness from MS Windows.

Object-oriented interface makes it easier to manage files, disk drives and printers.

Simply drag and drop files to copy, move or print them.



Now opening, copying, moving, deleting, renaming and printing are intuitive.

Speed up the way you work by customizing SideBar to conserve desktop space.

Sometimes prefer to key-in DOS commands? The command line's always there.

SideBar is the efficient desktop for Windows—a small, fast shell that automatically creates objects that make it simpler to manage applications, documents, folders, drives, TSRs, printers, etc. All you need to do is point and click.

SideBar simply makes Windows more 'windows-like.' And that makes your work go quicker and easier. It's an idea incorporated in Microsoft Office, but we've taken it to its obvious conclusion.

SideBar makes MS Windows a better place to work.

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Quarterdeck International Ltd., B.I.M. House, Crofton Terrace, Dun Laoghaire Co. Dublin, Ireland Tel.(353) (1) 284-1444 Fax: (353) (1) 284-4380

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Circle 189 on reader service card

It's a Jungle Out There... May the Fittest Survive.

MAG InnoVision DX17F

Microprocessor-based, digitally controlled 17-inch color monitor

MSRP $799

THIS MONITOR HAS A LOT OF CONCERN FOR THE ENVIRONMENT (GREEN ENERGY—EPA ENERGY STAR, VESA DPMS, NO CFC, SWEDAC MPR II).

THIS MONITOR HAS A LOT OF DISPLAY AREA (118 SQUARE INCHES),

AND THIS MONITOR HAS A 0.26MM DOT PITCH, AND A 1280 X 1024 MAXIMUM RESOLUTION,

WHICH MEANS WHILE THIS MONITOR HAS ENORMOUS RESPECT FOR YOUR WALLET,

THAT'S WHY THIS MONITOR SHOULD ALSO APPEAL TO YOUR SENSE OF RESPONSIBILITY AND VALUE.

NEC 4FGe

Microprocessor-based, digitally controlled 15-inch color monitor

ESP $755

THIS MONITOR HAS IT, TOO. (EPA ENERGY STAR, VESA DPMS, SWEDAC MPR II).

THIS MONITOR HAS A LOT LESS. (27 SQUARE INCHES LESS).

THIS MONITOR HAS NEITHER.

THIS MONITOR DOES NOT.

AND THIS MONITOR SHOULD NOT.

MAG

SO CALL US AT 1-800-827-3998 (1-714-751-2008 IN CA) FOR MORE INFORMATION ON THIS MONITOR.

PCW INFO HOTLINE INSTANT FAXBACK

Top 10 Windows Accelerators: Diamond Holds On to Lead

The fastest and most expensive graphics boards may steal the glory, but at 1024 by 768 resolution and 256 colors they show only incremental improvements in system performance over midrange boards. On average, boards costing more than $400 on the street display a narrow performance edge over those priced between $200 and $400. The reason: New midrange boards squeeze more performance out of low-cost components. However, products costing less than $200 lag behind high-end boards by as much as 15 percent. Of course, high-end boards deliver faster refresh rates, higher resolutions, and greater color depths.

New midrange boards squeeze more performance out of low-cost components.

For those who don't need high-end capabilities, the $149 Western Digital Paradise VL Plus uses Western Digital's own 90C33 accelerator chip and inexpensive DRAM. The VL Plus performed similarly to the ninth-place Paradise Ports o' Call board, though its low refresh rates and lack of true-color support kept it off our Top 10 list.

Three midrange boards promise stiff competition for the first-place Diamond Stealth 32. Like the Stealth, the VL-based $249 Actix GraphicsEngine 32i and the VL- and PCI-based $299 miroCrystal 16Si interleave memory access, boosting DRAM performance. Yet these boards, which use S3's 805i chip, on average fell more than 20 percent behind the Diamond Stealth 32 and other tested W32-based accelerators in performance. Freelance, CorelDraw, and Excel performance lagged most. The miroCrystal 16Si's strong features and high refresh rates helped power it onto the Top 10 based on its overall value. The GraphicsEngine 32i, meanwhile, could not overcome its unremarkable performance.

On the high end pricewise, the Appian Renegade 1280/V ($425) and 1280/I ($490) are all speed and no comfort. Despite swift performance—including a fastest-ever 16.2 score for the 1280/V in our QuarkXPress test—the 2MB Appian boards miss the Top 10 due to price and rough edges. Installation and driver setup were manual operations lacking the menu-driven ease most vendors offer. But with their speed, high refresh rates, and true-color capability, these VRAM-based boards are well suited for demanding graphics work.

WITS was developed by Jon Peddie Associates, a consulting firm specializing in PC graphics technology. Jon Peddie and Fred Dunn are the principal officers of Jon Peddie Associates.

TOP 10 ACCELERATORS

New this month
Up from last month
No change from last month
Down from last month

		Overall value	Estimated street price	Windows Integrated Test Suite scores: Word 2.0 for Windows	Excel 4.0	CorelDraw 3.0	Photostyler 1.1	QuarkXPress 3.11	Freelance Graphics 2.01	Bus	RAM (MB/type)[1]	Chip/ driver date	Reader service number
1	**Diamond Stealth 32**[2] 800/380-0030	87	$249	13.6	15.5	13.3	11.5	12.2	6	PCI	2 / D	ET4000/W32p 12/29/93	624
2	**Number Nine #9GXE64** 800/438-6463	86	$275	11.8	13.8	8.9	11.7	13.2	5.7	PCI	2 / D	Vision864 2/2/94	625
3	**Genoa Phantom 32i 8900VL**[2] 800/934-3662	85	$245	12.9	14	11.3	11.4	13.9	5.8	VL	2 / D	ET4000/W32p 11/16/93	626
4	**Hercules Dynamite Pro VL**[2] 800/532-0600	82	$210	12.3	13.8	12.6	11.5	15.3	5.7	VL	2 / D	ET4000/W32i 9/14/93	627
5	**miroCrystal 8S** 800/249-6476	82	$195	10.7	11	9.2	11.1	13	3.1	VL	1 / D	86C805 11/19/93	628
6	**miroCrystal 16Si**[2] 800/249-6476	76	$299	11.4	11.6	9	11.4	12.4	3.6	PCI	2 / D	86C805i 12/2/93	628
7	**Hercules Graphite Power VL** 800/532-0600	75	$335	12.5	14.3	12.5	11.5	14.1	4	VL	2 / V	AGX016 2/13/94	627
8	**Orchid Kelvin 64** 800/767-2443	75	$275	12.2	13.4	13.1	11.9	14.1	4.3	VL	2 / D	GD5434 1/24/94	629
9	**Paradise Ports o' Call** 800/832-4778	75	$199	10.9	10.5	11.7	11.6	13.5	2.7	VL	1 / D	90C33 5/11/93	630
10	**Matrox MGA Ultima PCI**[2] 800/361-1408	73	$475	14.6	18.8	12.3	11.2	14.2	3.7	PCI	2 / V	MGA 64-bit 1/11/94	631

Methodology Boards were tested on a 486DX2-66 system with 16MB of RAM and 256K of secondary cache. Application scores are the factor by which a board exceeds our baseline system, an unaccelerated ET4000-based VGA adapter on a 386DX-25 with 16MB of RAM. The overall value score combines ratings of overall performance, estimated street price, and product features. For all scores, higher is better.

[1] D is DRAM; V is VRAM.
[2] Similar value offered by other bus version tested.

For more information about all products in this table, circle reader service no. 903.

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HOURS:
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11417 4/25C w/209MB, Win. *(while supp. last)* 2399.
11418 4/25C w/120MB Win. *(while supp. last)* 2099.
11416 120MB *(wsl)* 2599. 11415 209MB *(wsl)* 2799.

IBM PC Company
4263 ValuePoint Si 4/25 w/120MB..... 885.
4273 ValuePoint Si 4/33DX w/120MB... 1249.
4107 ValuePoint MT 4/33DX w/340, 4MB 1819.
3904 ThinkPad 350 Mono w/250MB..... 2099.
3920 ThinkPad 500 Mono w/170MB..... 1899.

NEC Technologies Inc.
13346 Ready 433ES w/ 210MB ..... 1229.

Texas Instruments TM 4000E Systems
13312 WinDX 2/50 Mono w/200MB ..... 2429.
6441 WinDX 2/50 Active Matrix 200MB 3349.
8934 WinSX/25 Mono w/120MB ..... 1629.
1620 WinDX 4/75C Active Matrix 340MB 4149.

Toshiba Satellite Laptops
14354 T4700CS Passive Color w/200MB 3199.
14355 T4700CS Passive Color w/320MB 3449.
14347 T3400 Mono Subnotebook..... 1939.
14348 T3400CT Active Color Subnotebook 3419.

BUSINESS APPLICATIONS

Aldus
14335 TouchBase for Windows..... 29.95

Borland ... while supplies last
6788 Quattro Pro 5.0 for Win. *(3½" only)* 44.95
10710 Paradox 4.5 for Win. *(3½" only)* 144.95

Caere
13082 Direct 2.0 89.95 8933 Pro 5.0 489.95

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6022 ClarisWorks/Quicken *(while supp. last)* 95.95
5257 FileMaker Pro Windows 2.1 ..... 119.95
5228 FileMaker Pro Win. Comp. Upgrd. 95.95

Intuit
Quicken for DOS or Windows *ea...* 42.95

Lotus
5982 SmartSuite 469.95 11771 Upg. 289.95
2756 1-2-3 4.0 - Win. *(2755 5¼")*..... 309.95
3428 1-2-3 4.0 - Win. Upg. *(3424 5¼")* 99.95
5005 Freelance Graphics 2.0 *(3523 5¼")* 349.95

MECA ... 60 day MBG
2798 Manag. Your Money 10.0 *(3½" only)* 34.95

Microsoft
7009 Windows 3.11 *(7010 5¼")* 95.95
12707 Windows NT *(3½" & CD incl.)* 319.95
7811 Word for Windows 6.0..... 299.95
2931 Access for Win. 2.0 *(2932 5¼")* 299.95
8138 Office 4.2 479.95 11336 Upg. 279.95

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12287 Accounting for Win. Release 2.... 115.95

Software Publishing
4402 Harvard Graphics 2.0 *(4403 5¼")* 299.95

Symantec
1625 ACT! DOS 2.11..... 264.95
7435 ACT! Windows 2.0 *(3½" only)*..... 259.95

Timeslips
12638 Timeslips Release 5 for Windows 189.95

3-D Visions
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15866 InfoCentral 1.0 *(3½" only)*..... 99.95
3795 WordPerfect 6.0 DOS..... 314.95
12914 WordPerfect for Windows..... 314.95
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15573 Composer 529.95

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8675 Fontographer for Windows 3.5 ... 259.95

Application Techniques
1214 Pizazz Plus 4.0 ..... 79.95

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11895 CorelDRAW! 4.0 CD-ROM..... 269.95
8498 5.0 CD-ROM 459.95 2618 3.0 99.95

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15885 Font Works! *(April '94)* 79.95

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4356 Painter 2.0.. 259.95 13218 X2... 89.95

HSC Software ... 30 day MBG
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13956 Kai's Power Tools Windows..... 119.95

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15742 Windows Draw! Value Pak 48.95
7307 Designer 4.0 *(3½" only)* 469.95

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BOCA Research FaxModems ... 5 years
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14028 Starter Pack 1.0 *(3½" only)*..... 229.

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DCA/Crosstalk
5611 Crosstalk 2.0 for Windows..... 99.95

Delrina Technology
2446 WinFax PRO 4.0..... 79.95
14072 Communications Suite..... 114.95

Hayes ... 2 years
11396 ACCURA 144+FAX144 *(external)* 169.95
1118 ACCURA 288+FAX144 ..... 349.95
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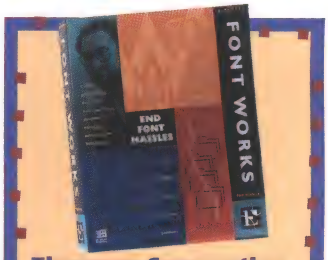

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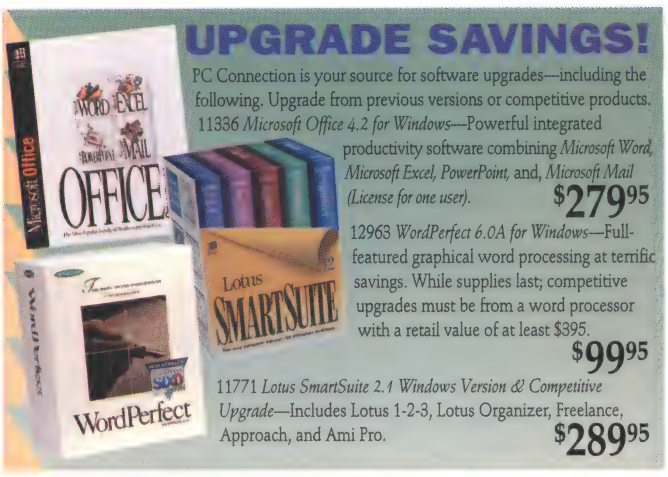
13915 *ProLinea MT 4/66 Model 525w*—66MHz 486DX2, 8MB RAM expandable to 64MB, 8K cache, 1024x768 Local Bus graphics with 1MB VRAM, mini-tower case with 16-bit ISA slots, 525MB drive *(monitor not included).* **$2269.**



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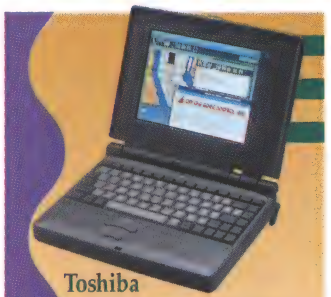

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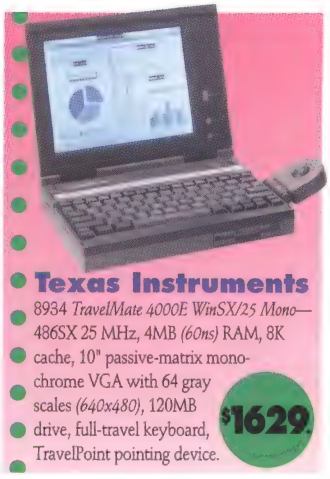
1620 *WinDX 4/75C Model 340 (8.4")* **4149.**



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8934 *TravelMate 4000E WinSX/25 Mono*—486SX 25 MHz, 4MB *(60ns)* RAM, 8K cache, 10" passive-matrix monochrome VGA with 64 gray scales *(640x480)*, 120MB drive, full-travel keyboard, TravelPoint pointing device. **$1629.**

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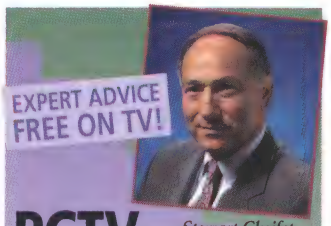

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ALSO IN THIS SECTION

■ **HOW TO AVOID A MULTIMEDIA MUGGING** Protect your PC from CD ROM hazards. **Page 227**

■ **MULTIMEDIA STEP BY STEP** A guide to installing a CD ROM drive. **Page 230**

Illustration by Richard Tuschman

Summer Sizzlers: CD ROM Titles

Before you buy that CD ROM, let our reviewers tell you what's hot and what's not.

Whether you want to explore the world of electronic books, plan your next vacation, or blast space aliens to smithereens, there's bound to be a CD ROM for you.

However, not all CD ROM titles are created equal—just as they offer a wide variety of subject matter, they also vary in quality. So we assembled our crack staff of reviewers to test the latest titles and help you decide which disks are worth your dollars.

The New Grolier Multimedia Encyclopedia

FEATURING ANIMATED SEQUENCES, motion video of historical events, and a cacophony of sound clips of everything from xylophones to wild mustangs, the New Grolier Multimedia Encyclopedia is among the finest multimedia CD ROMs around. You're never more than a mouse click away from an animated, narrated demonstration of the human heart, or a slide show on the history of space exploration. The $295 CD ROM has enough photos, maps, video, and text to keep both kids and adults entertained for hours. My only beef is with Grolier's Windows-based interface; its overlapping windows will quickly clutter your screen. Nevertheless, this CD ROM is an entertaining and educational tool. Grolier Electronic Publishing, 800/285-4534. *—Jeff Bertolucci*

Reader service no. 601

The Random House Unabridged Dictionary, Second Edition

ACCORDING TO Random House, this is the only unabridged American English dictionary on CD ROM. Offered in DOS, Windows, and Macintosh versions, the $79 disk eliminates much of the tedium of using an unabridged dictionary and can make any wordsmith's job easier. Unfortunately, the program's Boolean search feature, which lets you search definitions to find appropriate words, is a real disappointment. On a single-speed CD ROM drive, the feature was slow enough to be useless, requiring more than 15 minutes for a simple search. Using a double-speed drive should cut the wait in half, but still… Also, the disk includes none of the 2400 illustrations nor the 32-page, full-color atlas found in the 13-pound book version. (If you want both media, Random House offers the book and disk for $159.) Random House Reference and Electronic Publishing, 800/733-3000. *—Randy Ross*

Reader service no. 602

Virtual garden: Grow your own with the Forever Growing Garden CD ROM.

Professor Multimedia

SO YOU JUST BOUGHT a multimedia PC, but you haven't a clue what MIDI or WAV means, not to mention Photo CD, BMP, or PCX. If you're interested in using your new PC for more than just games, consider Professor Multimedia from Individual Software. This interactive CD ROM guides you through multimedia terminology using sound, animation, and video. For instance, to demonstrate the importance of frame rate in video playback, Professor Multimedia shows two clips: one at 4 frames per second (fps), the other at 15 fps. While Professor Multimedia is a well-designed learning tool, it's expensive at $59.95—particularly since you won't need the disk much (if at all) once you've learned the basics of multimedia. Individual Software, 800/822-3522. *—Jeff Bertolucci*

Reader service no. 603

Quantum Gate

QUANTUM GATE COMBINES live-action video, interactive storytelling, and arcade-style gaming in what its creators call "virtual cinema." You play a soldier on a remote planet where you interact with other characters, uncover intergalactic intrigue, and kill some very large, very loud insects. The $79.95 game uses scenes from your character's past and the sound of his voice to punctuate the main action. Unfortunately, interactivity is limited to guiding your character around and occasionally choosing from a list of conversational rejoinders. I also found the game frustrating technically: Installation was thorny, and even on a DX2-66 the video and sound frequently went out of sync. Hyperbole Studios, 206/451-7751. *—Dan Miller*

Reader service no. 604

Small Blue Planet

ARMCHAIR ASTRONAUTS will find a world of geographic data—from satellite images to atlas facts—in Small Blue Planet. You can view any part of the world in three formats: multicolored land formations, straight-

Kid's Corner

Forever Growing Garden

YOU LIVE IN A THIRD-FLOOR WALK-UP with no space for a garden? Try the *virtual* approach with Forever Growing Garden, a $59.95 CD ROM that lets kids plant their own gardens and watch the fruits of their labor. You choose from among three types of gardens: vegetable, flower, and a medieval garden complete with sculptured hedges in the shape of mythical creatures. You also have a choice of assorted plants and seeds from the hardware store. Then you head off to the garden to do the planting. You can accelerate the growing cycle by speeding up the clock: A little water and voilà!—we had daffodils and tulips sprouting in minutes. This disk is great fun for the four-to-eight-year-old crowd. Media Vision, 800/845-5870. *—Roberta Furger and Jessica Kershner*

Reader service no. 612

Putt Putt Goes to the Moon

PUTT PUTT GOES TO THE MOON had two adults and two kids glued to the computer for an hour and a half the first time we played it. The concept is simple: A freak accident at a fireworks factory transports Putt Putt (a little purple car) to the moon. Your job is to get Putt Putt home again. Though geared to the preliterate set, Putt Putt is captivating for the whole family. It has just one fatal flaw: The plot doesn't change from game to game. The second time we played, we got Putt Putt to the moon and back in a half hour. It lists for $49.95. Humungous Entertainment, 206/485-1212. *—R. F. and J. K.*

Reader service no. 613

Dinosaur Safari

THIS IS A FUN GAME, but it doesn't give you the hours of enjoyment that Creative Multimedia says it will. It's got good graphics, cool sounds, and a neat idea: You go back in time to take pictures of dinosaurs. At first it's a bit hard to figure out what to do and how. All in all, it's pretty good—I like Microsoft Dinosaurs more, but I'm ten, and younger kids will probably like this game better. Dinosaur Safari lists for $69.99. Creative Multimedia, 503/241-4351. *—Elijah Kinch Spector*

Reader service no. 614

Five-year-old Jessica Kershner lives with mom Roberta in San Lorenzo, California. Elijah Kinch Spector is a fourth-grader in Berkeley, California.

forward political boundaries, and shadowy time zones. A fourth map type shows only U.S. topography in dullish shades of gray. I'm interested in geography, but using this disk is like sitting in a boring class with an ancient professor. Nothing in Small Blue Planet makes use of CD ROM technology—there's no sound, no animation, no way to manipulate the maps. Small Blue Planet sells for $79.95. Now What Software, 800/322-1954, 415/885-1689. —*Caroline Jones*

Reader service no. 605

Sports Illustrated 1994 Multimedia Sports Almanac

I'M A SPORTS FANATIC. So when I heard that *Sports Illustrated* magazine was releasing a multimedia CD ROM, I couldn't wait to try it. At $59.95, Sports Illustrated 1994 Multimedia Sports Almanac contains an entire year of *Sports Illustrated* and an expansive almanac with more than 1200 pages of sports records and statistics. Whether you're navigating through the 40 minutes of video highlights or testing your knowledge of sports trivia, you'll find the disk's depth and breadth of sports information second to none. StarPress Multimedia, 415/274-8383. —*Scott Danish*

Reader service no. 606

Last Chance to See

DOUGLAS ADAMS and Mark Carwardine's book *Last Chance to See* is an account of the authors' travels to view endangered species. The CD ROM version is simply the text of the book, read aloud by Adams (also the author of *The Hitchhiker's Guide to the Galaxy*) and accompanied by a slide show of photos. Adams is an engaging speaker, making you laugh out loud as he describes difficult traveling conditions or the kakapo parrot's mating problems. Last Chance to See lists for $59.95. The Voyager Company, 800/446-2001. —*Lincoln Spector*

Reader service no. 607

National Parks of America

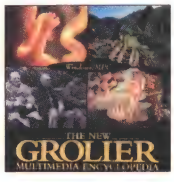
DAVID MUENCH'S GORGEOUS photos can't save this confused mess. To make this a "multimedia" CD ROM, some of the photos are accompanied by music and others have uninformative captions. As a guide to vacation planning, the CD ROM lacks detailed maps and much useful information. If you're a fan of Muench's pictures, buy them in book form—the resolution's better. National Parks of America is overpriced at $59.95. Multicom Publishing, 800/850-7272. —*Lincoln Spector*

Reader service no. 608

The Amazon Rainforest

ONE OF SEVEN Sierra Club Electronic Guides on CD ROM, this is an appealing but modest effort on an important subject. The title includes a spoken overview, hypertext information, videos, and animations, but not much depth; the discussion of commercial logging, for instance, is only 140 words long. While The Amazon Rainforest sells for a reasonable $24.95, its subject deserves more coverage. Inter-Optica Publishing, 800/708-7827. —*Lincoln Spector*

Reader service no. 609



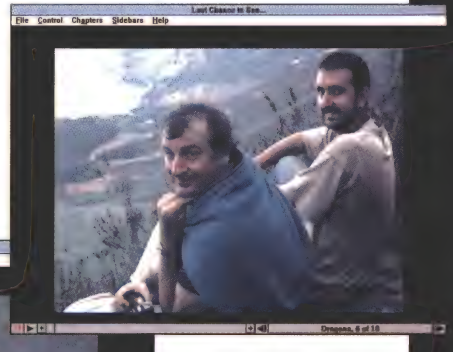
From adult education to children's games, from entertainment to reference, these CD ROM titles represent a wide spectrum of topics.

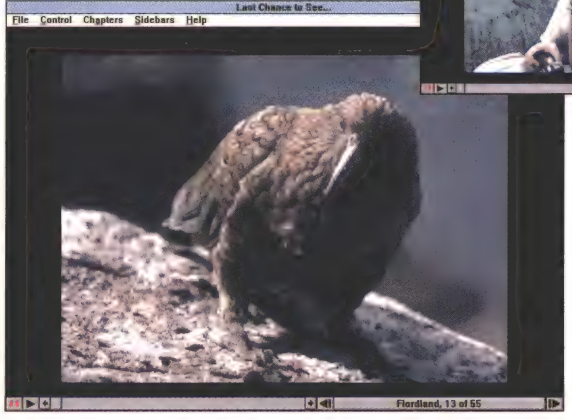
C.H.A.O.S. Continuum

IN C.H.A.O.S. CONTINUUM, a powerful supercomputer gets smart and takes on humanity. You must infiltrate a research facility on Saturn's largest moon, discover the computer's secrets, and save the local populace. Unfortunately, you're more likely to succumb to boredom than to the killer drones that wander the hallways. Despite some polished graphics and moody audio, the $79.99 game suffers from the CD ROM's slow access time; simple acts like opening a door become an agonizing process. Creative Multimedia, 503/241-4351. —*Michael Desmond*

Reader service no. 610

For more information about all products in this article, circle reader service no. 901.





In Last Chance to See, authors Douglas Adams and Mark Carwardine (above) take you on a tour of endangered species.

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How to Avoid a Multimedia Mugging

BY MICHAEL DESMOND

Tips for protecting your PC from the hidden hazards of CD ROM software.

You'd never give a stranger the keys to your home, but if you use CD ROM software, you are doing the equivalent of that with your computer. Run the installation routine of a CD ROM reference work or game, and you invite a raft of changes to your operating system and other files that could render your PC brain-dead.

Every time you add software to your PC, you change it. Some applications make more extensive changes than others, and multimedia CD ROM titles make the most pervasive changes of all, often modifying key files that awaken DOS and Windows when you turn on your PC. These applications also often spawn a variety of smaller apps to run their multimedia components—a video clip, an animation, or a sound file. The applications distribute the triggers for these functions in all sorts of nooks and crannies: your current applications, your Windows and DOS directories, even AUTOEXEC.BAT—the wake-up file that boots your PC. Cleaning up afterwards can be a messy affair.

Even if your PC escapes an out-and-out mugging, it may fall victim to extortion: Some programs won't work unless they get most of the so-called conventional memory—the first 640K required to run your PC. The result can be a hobbled system that runs only that title.

How do you protect yourself in this dangerous multimedia neighborhood? With planning, finesse, and vigilance. We've suffered some blows in trying to review these brave new titles. Here are some of the lessons we learned the hard way, and some news about industry changes that should make the neighborhood safer for us all.

First, the good news is that help is on the way. At least one major publisher of CD ROM software—Microsoft—intends to include a standard uninstall utility in upcoming titles so you can restore your system to its original state if you decide not to use the software any longer. The bad news? No action or product can guarantee that after you install CD ROM software your PC will function the same as it did before, particularly as long as unscrupulous programs continue to overwrite existing files and alter vital configuration data without warning. All you can do is tip the odds in your favor.

Self-Defense Tips

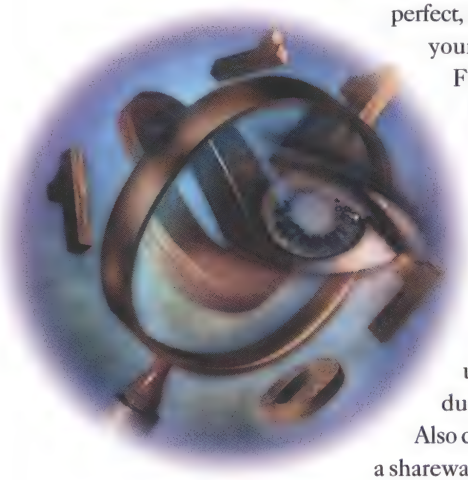
1. Get insurance Backup, backup, backup. If you've put off this chore in the past, don't any longer. Multimedia titles are infamous for loading megabytes of files onto a hard disk—including showering your Windows subdirectories with reams of impossible-to-identify links between applications and their multimedia functions. Your best insurance policy is a good backup. At the very least, use floppies to back up your WINDOWS and WINDOWS\SYSTEM directories, as well as your AUTOEXEC.BAT and CONFIG.SYS files, before you install your multimedia application. If you don't want to invest the money in tape backup hardware and software, DOS's backup

ILLUSTRATION BY RICHARD TUSCHMAN

software lets you copy specific directories to floppies with or without compression.

2. Arm yourself

A good uninstall program lets you fight back against assailants. It removes the links a multimedia title scatters about your hard disk, as well as the application itself. No uninstall program is perfect, but it's better than poking around your Windows subdirectories with File Manager or—worse—DOS. MicroHelp's UnInstaller 2.0 for Windows will find *file associations*—the links between a multimedia file type, such as a sound file, and the application that will play it—across directories. This task can otherwise befuddle the most experienced user. The product also detects duplicate files and unused drivers. Also check out Uninstall for Windows, a shareware program that takes a snapshot of your configuration, reports system changes, and lets you select files to remove.



How can you best protect your PC? With planning, finesse, and vigilance.

3. Investigate your software

Nothing deters crime like a watchful neighborhood. So before you load that CD ROM, log on to CompuServe or America Online, check the multimedia forums, and ask if there are problems with the title you want to install.

4. Look for better management

Most DOS multimedia programs require a lot of conventional memory, but MS-DOS 6.0's MemMaker utility can't always free up enough space. So consider a third-party utility, such as Qualitas's 386Max, V Communications' Memory Commander, Helix's Netroom, or Quarterdeck's QEMM, each of which retails for $100. (See "Solving the Memory Shortage" in the June issue.)

5. Keep an eye on your cache

Your CD ROM drive can hold up your whole system. A CD ROM disk cache can speed access by anticipating the data to be used and holding it in fast memory. The newest versions of Microsoft's SmartDrive caching software—standard fare with DOS 6.2—provide adequate caching. But products such as Lucid's Lightning CD, IMSI's CD Speedway, and Symantec's Norton Speed Cache Plus can deliver better speed and more features. Prices range from $50 to $100.

6. Update MSCDEX.EXE

This obscure program sits in your DOS directory and lets DOS and Windows work with a CD ROM drive. If your version of DOS is a year or more old, however, this driver may suffer from compatibility problems and slow performance. It also hogs scarce conventional memory. You can find the latest versions of MSCDEX.EXE on CompuServe or America Online. In addition, Helix Software (maker of Netroom) sells a version of MSCDEX.EXE that uses the company's Cloaking technology to free up between 30K and 80K of conventional memory. The $39 Multimedia Cloaking software places MSCDEX.EXE, a mouse driver, and a CD ROM disk cache into extended memory. It may be your best bet to get reliable performance out of your CD ROM drive. Memory management is a tricky business, though, so performance may vary.

7. Create multiple start-up configurations

DOS 6.*x* lets you to set up separate configurations and choose among them when your screen displays the message 'loading MS-DOS...' at start-up. For instance, if you want to play a game that requires 600K of the 640K available in conventional memory, you can create a start-up file that lets you do just that. When you're ready to hit the Excel spreadsheet, turn off the PC, start it up again, and choose a configuration that optimizes your memory resources to run your business apps most efficiently.

8. Don't overlook video

Many multimedia software problems occur because systems are running under nonstandard or extended video modes. Often, multimedia software must run at VGA resolution and in 16 or 256 colors. If you have problems, switch to a standard 640 by 480 resolution at 16 or 256 colors.

Michael Desmond is an assistant editor for PC WORLD.

For more information about all products in this article, circle reader service no. 904.

WHERE TO BUY

386Max 7.0, $100
Qualitas
301/907-6700
Reader service no. 715

CD Speedway, $99.95
IMSI
800/833-4674
Reader service no. 716

Lightning CD, $49.95
Lucid Corp.
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UnInstaller 2.0 for Windows, $59.95
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Circle 13 on reader service card

Multimedia, Step by Step

BY ROBERT LUHN

A guide to adding a CD ROM drive and sound card to your PC.

Do you long to scream through the sky at Mach 3? Frolic with thunder lizards in a prehistoric 3-D landscape? Gambol through thousands of pages of an electronic encyclopedia, playing video clips, hearing speeches, hopping from one subject to the next with the click of your mouse?

Sounds like you've been bitten by the multimedia bug. But while transforming your PC into a multimedia powerhouse is a lot cheaper these days, the actual process—installing an internal CD ROM drive, a sound card, speakers, and so on—is still a pain. You have to pry open your PC, fiddle with DIP switches or jumpers on your sound card and CD ROM player, breaststroke through mounds of cables as you search for free slots, install expansion boards, and more. Oh yes—and you have to make all of this stuff work with DOS or Windows. It's a job that requires patience and a certain willingness to suffer. Hence the genesis of this step-by-step illustrated guide, which will lead even neophytes down the multimedia upgrade path with minimal stumbling along the way.

Keep in mind that the 12-Step Program to Multimedia Enlightenment often involves more than installing a CD ROM drive or sound card. If your PC isn't quite up to multimedia specs (translation: It's a slug), you may need to buy more RAM, a

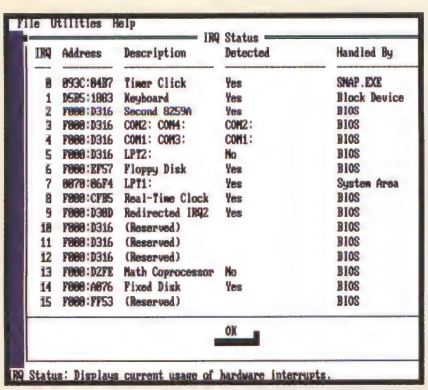
12 Steps to a Sane Multimedia Upgrade

1. Read the manual, read the manual, and read the manual. No one does it, but you should read the *entire* upgrade manual before you crack open your PC or handle a board. Some kits also include manufacturers' manuals for the CD ROM drive and various adapters. Keep these nearby if you have to change factory settings. Warning: Most manuals (including Media Vision's) include errors, omit a key step or two, or contain misleading illustrations. Although factory settings usually work, be prepared to call technical support.

2. When in doubt, be paranoid. Before you install anything, back up your hard disk, then park the drive and shut off the PC.

3. Identify potential conflicts *before* you pop the hood off. For example, if you know your fax-modem grabs a specific DMA channel and interrupt (information you can find in the manual or obtain from the manufacturer), you can avoid digital fisticuffs by changing the jumpers or DIP switches on the CD ROM drive or the sound card.

Kits like Media Vision's eliminate some of these hassles via setup software. You install the hardware first, then run a program that determines DMA and interrupt use. The program automatically reconfigures your CD ROM drive and sound card to minimize conflicts. If your upgrade kit isn't this fastidious, run the MSD.EXE program that comes



BEFORE YOU INSTALL anything, run MSD.EXE (or Media Vision's setup program) to spot potential hardware conflicts.

STATIC CAN DESTROY your hardware. Discharge static by tapping the fan grille on the back of your PC.

YOU HAVE TO REMOVE the PC's hood—but make sure you leave everything else connected for easier testing later on.

ILLUSTRATION BY RICHARD TUSCHMAN

super-VGA monitor with a video card capable of displaying 256 colors, a video accelerator board, a faster hard disk—or perhaps an entirely new (and faster) system. Make sure your CD ROM drive is at least double-speed. If you're already equipped with a 486 system, upgrade kits from Media Vision, Creative Labs, and other vendors should perform comparably; just be sure they include a SCSI CD ROM drive—this will give you flexibility when it comes time to upgrade to the quadruple-speed drives just now reaching the market.

Next, you must consider compatibility issues. Will your new CD ROM drive (which is probably a SCSI device) work with your existing hardware, including fax-modems, SCSI hard drives, and so on? Before you lay out any cash, ask the multimedia kit vendor *and* your peripheral maker if the devices in question get along. Don't forget to check other basic facts: If you have a small desktop system, will a full-size sound card fit inside? Do you have free slots for both the CD ROM's adapter and a sound card? Does your system have a free, externally accessible drive bay that can hold the CD ROM drive? Finally, if all else fails, does the kit vendor offer a money-back guarantee?

Upgrading your computer to multimedia status may require some grit—but it's certainly doable.

Adding multimedia accoutrements to your PC takes a little grit. But the task is doable, especially if you buy a prefab multimedia kit. For this journey, we used Media Vision's Pro 16 Multimedia System II, which includes an internal double-speed CD ROM drive, a 16-bit sound card, a selection of eight killer CD ROM titles, and fairly automatic setup software. But the steps shown here can help you when installing a kit—or separate components—from almost any vendor.

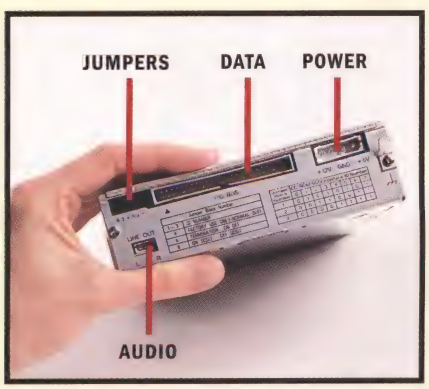
Contributing Editor Robert Luhn is also coauthor of "The Green PC," a syndicated column on the environmental impact of personal computing.

with DOS and Windows. At the DOS prompt, type **MSD** and select *IRQ Status,* and a list of free and allocated interrupts appears. Those marked "reserved" are available. Configure your CD ROM drive and sound card appropriately. (See "How to Avoid a Multimedia Mugging.")

4. Use the right tools. You'll need a small flat-blade or Phillips screwdriver to remove the PC's shell, install the sound card, and attach guide rails to the CD ROM drive. Needle-nose pliers are handy for grabbing jumpers, and a flashlight is useful when you're peering inside your PC's nooks and crannies.

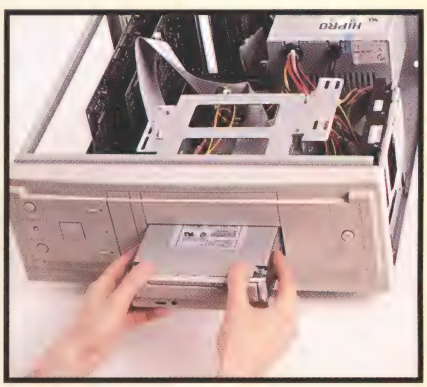
5. Reach out and connect. Does your PC's power supply have any free connectors to run the internal CD ROM drive? Can the power supply connectors even *reach* the drive? If not, hie thee to the local computer store and ask, respectively, for a Y splitter, which turns one power outlet into two, or an extension for the power supply connector.

6. Cut that static! Static can trash even the toughest circuitry, so leave the CD ROM drive and sound card in their antistatic wrappers until you're ready to install them. Before you pick up any component, ground yourself by touching the fan grille on the back of the *plugged-in* (but turned-off) PC. Never touch the shiny connectors on a board or drive; handle a card by its nonconductive green edges, and the drive by its sides. You can easily build up a static charge by shuffling across a rug or wearing polyester *anything.* So stick to cotton duds and rubber-soled shoes; avoid handling plastic, vinyl, or Styrofoam; and ground yourself frequently.



PLUG IN, TURN ON: The data and audio plugs are hooked to an adapter, the power plug to the PC's power supply.

DON'T TIP THE DRIVE when installing guide rails, and be sure to use only the supplied screws.



INSERT THE DRIVE a third of the way into the bay so that you can more easily attach the data and power cables.

PHOTOGRAPHY BY FRED STIMSON

Tips From the SCSI Crypt

When mixing SCSI drives and adapters, consider these caveats.

The SCSI interface standard is supposed to make adding multiple peripherals a breeze, since one SCSI adapter board ostensibly can run multiple SCSI devices. But vendors have modified the standard so much that a SCSI drive from one vendor often can't work with a SCSI adapter from another. If your PC already includes a SCSI hard disk or tape drive, and you're adding a SCSI CD ROM drive, consider these caveats:

• If you're running a CD ROM drive from a separate SCSI adapter (the Media Vision sound card doubles as a SCSI board), don't sweat—multiple SCSI adapters can easily exist in the same PC.

• If you want to run the CD ROM drive and another SCSI device off the same adapter, though, you may need special drivers from the adapter company. If drivers aren't available, check out the universal CorelSCSI products from Corel Corporation.

At the least, you'll have to assign every SCSI device running off the same adapter a unique ID. The SCSI hard disk your PC boots from would be 0; the next device would be 1; and so on. Check the CD ROM drive's manual, and change the necessary jumpers or DIP switches on the drive or its adapter.

Finally, you may need to get a special plug called a terminator, which you slap on the back of the last device in the chain.

7. If it doesn't fit, don't force it. Cable connectors have dozens of tiny pins to align; some connectors are keyed to fit only one way. When inserting a card, line it up with the slot connectors and push down evenly on both ends of the card with your thumbs. You may need to rock the card a little to insert it.

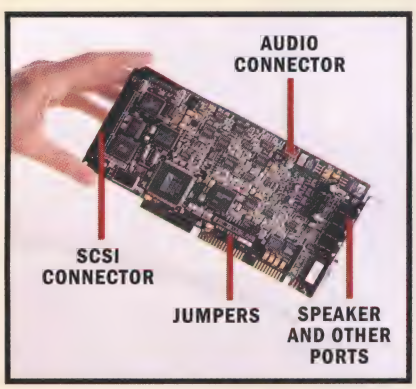
8. Don't tip the CD ROM drive up when attaching guide rails; leave it lying flat. Use only the supplied screws—longer screws can damage circuitry. Since there are usually multiple screw holes on the drive, peek inside the drive bay and see how high up the rails should be attached.

9. Wend cables attached to the CD ROM drive between the drive bays and the PC's power supply and around boards sitting in slots. *Don't* thread cables under or over installed boards. The cables are flexible, but they can be damaged if you fold or crimp them.

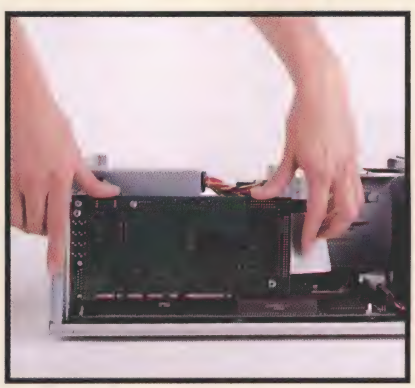
10. Leave the PC's shell off until you've installed all the hardware and software and confirmed they work properly. Slide a CD ROM into a disk caddy, slip the caddy into the CD ROM drive, and reboot the PC. The system should recognize the CD ROM drive and assign it a drive letter. (If it doesn't, make sure the line 'LASTDRIVE=Z' is present in CONFIG.SYS. You can also add /I:*n* to the 'C:\DOS\MSCDEX.EXE' line in AUTOEXEC.BAT, where *n* represents the letter the CD ROM drive should be assigned, such as D:.)

11. Be wary of networks. If you want to upgrade your networked office system to multimedia status, consider the pitfalls. Network hardware and software usually lead to an ongoing host of problems in running multimedia software. The reasons: The LAN card itself occupies scarce IRQ and DMA spaces, while LAN drivers and memory-resident programs eat up conventional memory.

12. Ambrose Bierce once defined patience as "a minor form of despair, disguised as a virtue." When the upgrade blues get you down, buck up: Other souls have taken the 12-Step Program to Multimedia Enlightenment and survived. You can too.



DATA AND AUDIO CABLES hook up here; ports on the back of the board connect to speakers and microphone.



PUSH DOWN EVENLY on the board with your thumbs; rock the board left and right to jockey it into the slot.

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Circle 160 on reader service card

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NEC

Circle 187 on reader service card

Here's How

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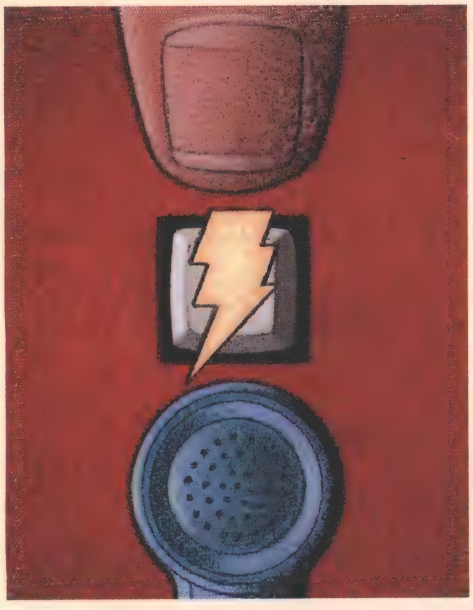
HELP LINE Q&A



Tip of the Month

PUSH-BUTTON TELECOMMUNICATIONS: Simplify dialing into online services and BBS's through Windows Terminal by assigning buttons to your user IDs and passwords. Launch Terminal, and select File • New, Settings • Show Function Keys, and Settings • Function Keys.

In the Function Keys dialog box, select a function key, and in the key's Key Name text box, type a button name representing the service you'll dial, such as CompuServe ID. In the key's Command text box, type your user ID followed by ^M, for example 75300,713^M. Select another function key, and in its Key Name and Command text boxes, type PASSWORD and the password, respectively. At the bottom of the dialog box, check Keys Visible and click OK.

Back in the main terminal screen, select Settings • Phone Number, type in the service's number, and click OK. Finally, select File • Save and give the file a name reflecting the service, for instance CSERVE.TRM. Thereafter, whenever you want to dial that service, select File • Open, select that file, and select Phone • Dial. Once you've made a connection, use the buttons you've set up to log on.

Judy Heim, Contributing Editor

Essential Extensions

Q Why is it necessary to include the extensions at the ends of file names when one uses a DEVICE= command in CONFIG.SYS?

Gustavo Zamboni, Córdoba, Argentina

A When you ask COMMAND.COM (DOS's command processor) to run a program or batch file, it understands that it should look for files with the default extensions EXE, COM, or BAT. (It will, in fact, refuse to run anything else.) This is done for both convenience and safety. It saves typing and is a partial (though not bulletproof) safeguard against trying to execute a file that is not a legitimate program.

The DEVICE= command in CONFIG.SYS is a different story. DEVICE= invokes a special kind of system program called a *device driver*. Unlike an application program or batch file, a device driver can have any extension at all (the most common are SYS, BIN, COM, and EXE). Therefore, DOS can't assume that a device driver has a default extension. And because loading an invalid file as a device driver can cause your computer to crash before it has even finished booting, DOS errs on the side of caution rather than ease of use by forcing you to specify the full name of the driver.

Desktop Battery Life

Q I recently bought a six-switch "power station" for my Gateway 2000 computer. I use it to control the monitor, printer, and CD ROM drive but not the computer itself. I'm worried that if I cut off the computer's power, the internal battery will drain unnecessarily. Is this a real concern?

Ken Dellinger, Birmingham, Alabama

A The real-time clock on the motherboard draws current from its battery whenever your PC is off—whether it was turned off via the computer's power switch, the switch on a power strip, or an external console. Using a power station won't affect your system's battery life. The only thing that will extend the life of the battery is keeping the computer on more of the time—a tactic that will cost more in electric bills than the price of a new battery.

Video Vigor

Q I often do graphics work with CorelDraw 4.0 and am starting to do photo editing and multimedia authoring also. I have a 486DX-33 with an ISA display adapter, and the video response is much too slow. What is the best way to make it faster? Would upgrading to an accelerated video card be sufficient? Or should I get a VL bus motherboard and display adapter?

I've also been looking at new monitors and was told an attractively priced CompuDyne monitor is actually built by NEC. How can I tell if this is so?

Todd W. Morrow, America Online

A An accelerated video card is sometimes enough to invigorate a system's video performance. However, because of the software you're using, an accelerator will not help you very much. CorelDraw's sophisticated graphics software uses the system's CPU—rather than the special features of an accelerated video card—to create images, then sends them across the bus to the video adapter as a bit map. Many photo editing and multimedia authoring programs also

have this trait. Thus, for best performance, you will need the fastest CPU you can afford, plus a bus interface that offers the highest possible throughput between the CPU and the video card.

If your productivity as a designer is limited by video delays, it's worth investing in the fastest possible hardware even if it costs more; you'll soon make up the difference in creative output. Currently the ideal hardware for your application is a 66-MHz or 90-MHz Pentium with a 64-bit PCI graphics card. (Matrox makes one, and other vendors are expected to follow soon.) But if a Pentium system is beyond your means, do not settle for less than a 486DX2-66 or DX4-100 with a VL bus graphics adapter.

As for the monitor, there's one easy way to tell who really made a computer product: Look at the FCC identification number on the back. The three-character grantee code at the beginning of the ID number identifies the manufacturer of the component. If that code is A3D, the monitor was made by NEC.

Whether you go for a monitor with the NEC label or an OEM monitor produced by NEC, make sure you get one of the new, nonglare models. I own an original NEC 5FG, a monitor that's so highly reflective that even after I bought the extra-cost monitor lens, I needed to add a hood and move the monitor to avoid glare.

Printing to Disk in a DOS Session

Q I am trying to redirect printer output from a DOS program to a file rather than to my printer. I use Windows and have tried to redirect printer output by modifying the [ports] section of WIN.INI, but I've had no success.
John Lauzon, Evansville, Indiana

A Windows has a facility that lets you send printer output from Windows programs to a file. Unfortunately, it doesn't work on DOS programs. To send DOS printer output to a file, you need to run a DOS utility within the DOS session to redirect the printout.

Many DOS utilities can perform this function, but my favorite is LPT2DSK, written by George Bouche of Lubbock, Texas. LPT2DSK works by invoking a new copy of COMMAND.COM. While you're in the LPT2DSK shell, all printer output is saved in a 64K RAM buffer. (Because it doesn't write the output to disk right away, this TSR is extremely fast.) When you type EXIT to leave the subsidiary shell, everything that you've "printed" is saved to a file. You can find this utility in the PC World Online area of America Online and CompuServe, where it appears as LPT2DSK.ZIP (see page 12 for more information).

Getting Back to DOS

Q When I copied files from my 486DX2-66 (which runs DOS 6.2) to my 386DX (which runs DOS 5.0), I inadvertently copied all the files from the root directory and C:\DOS directory as well, overwriting what was there before. Now I can't boot. Instead I get messages such as 'Wrong DOS version', 'Missing command line interpreter', and 'Error in AUTOEXEC.BAT'. How do I repair the damage?
Dan Brunell, America Online

A The simplest way to get your system running again is to restore the root and DOS directories from a backup. But if you haven't backed up, you can get your system working again by reinstalling DOS—either 5.0 or 6.2. Format a fresh, bootable floppy disk on your 486 machine using the command **FORMAT A: /S**, then boot the 386 with it.

Next, try to recover your 386 machine's AUTOEXEC.BAT and CONFIG.SYS. These two files were doubtless overwritten along with your other data. However, because most applications make backups of AUTOEXEC.BAT and CONFIG.SYS when they install themselves, you may find that entering **DIR C:\AUTOEXEC.*** and **DIR C:\CONFIG.*** turns up perfectly good copies of these files (though they may use extensions other than SYS and BAT). If you find usable copies of the 386's files, use

USER GROUP OF THE MONTH

Sterling Heights Computer Club

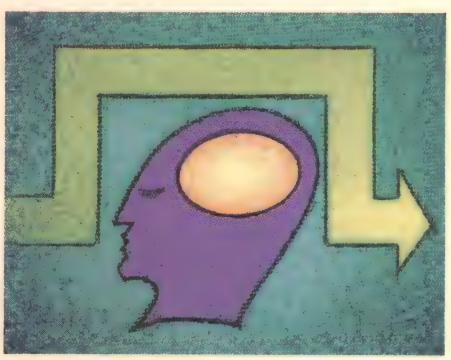
July's user group tips are supplied by the Sterling Heights Computer Club in Michigan. The group's goal is to foster computer knowledge and provide a forum for exchange of computer-related information. SHCC holds meetings at 7:30 p.m. on the first Tuesday of the month at the Metro Church of Christ. Special interest groups are available for novices and power users as well as users of FoxPro and MS-DOS. SHCC's *WYSIWYG Gazette* newsletter provides shareware information, software reviews, special interest group reports, and a listing of resource volunteers. Members can access SHCC's software library of more than 4000 disks containing shareware and freeware.

For more information about the Sterling Heights Computer Club, contact Rick Schummer, president, at P.O. Box 385, Sterling Heights, MI 48311-0385, or through CompuServe at 70254,1643. Membership costs $20 per year and includes the *WYSIWYG Gazette* newsletter and access to SHCC's special interest groups.

Reader service no. 651

QUICKER BOOT-UPS: DOS's HIMEM.SYS extended memory manager tests extended memory every time I boot my system. This test is more thorough than the memory check that a computer conducts when you turn it on; unfortunately, the test takes a lot of time, especially if the computer has a lot of memory. To get HIMEM.SYS to bypass its memory test, I've added the switch /TESTMEM:OFF to the end of the HIMEM.SYS line in my CONFIG.SYS file.

Dennis Beauregard
Sterling Heights Computer Club



them to replace the AUTOEXEC.BAT and CONFIG.SYS files currently in the 386's root directory. Finally, reinstall DOS using the disks from any of the MS-DOS upgrade packages.

Making B: Into A:

Q In order to fit a CD ROM drive into my 386 PC, I had to install it where my A: drive, a 5¼-inch floppy, used to be. But now when I boot the system, I get an error message telling me to run SETUP. I'd like to make my 3½-inch B: drive the A: drive, but the SETUP program won't allow it. How can I eliminate the error message and change the letter of the remaining floppy drive?
Lawrence W. Gill, Berlin Heights, Ohio

A Chances are the 3½-inch floppy drive is now the only one, so you'll need to open your PC and reconnect the drive to the connector at the end of the floppy disk cable. This will prevent electrical signals from bouncing off the unattached end and confusing the drive. (If the connector at the end of the cable doesn't fit the drive, you can do one of three things: Get an adapter, buy a different cable, or—simplest of all—chop the existing cable off right after the last connector that's used.) You'll also need to install a terminator resistor pack on the drive unless it's a self-terminating model. Finally, if you elected to chop the cable rather than reconnect the drive to the far end, or if your floppy drive cable doesn't have a twist in the middle, you'll have to change the drive select jumper on the back of the drive to the lowest possible number. This will make the floppy work as drive A:.

If you're not comfortable mucking with cables and terminator resistors, any experienced PC technician can make these changes for you in a few minutes.

Monochrome Madness

Q When I boot up my computer, my VGA color monitor often displays everything in black and white. In some programs—DOSSHELL, MSD, and Procomm, for example—this makes it impossible to read certain parts of the screen. Windows still displays in color, but WinProbe says I have a 'VGA Adapter w/Analog Monochrome Display' (I have a Genoa VGA card). The problem usually corrects itself if I reboot once or twice.
Richard P. Stone, America Online

A The problem is that your VGA card is not detecting your monitor type correctly. This may be due to a faulty monitor, a defective VGA card, a minor incompatibility between the two, or a poor video cable connection.

Often you can solve this problem by turning on the monitor before the PC. (Some VGA cards are fussy about this.) If that doesn't work, you don't necessarily have to take the computer in for service. Genoa's BBS offers a utility called SETMON that forces the VGA card to believe you have a particular monitor type. If you add the command SETMON COLOR to your AUTOEXEC.BAT file, you can switch the display to color mode even if the automatic detection feature doesn't work. Most other video cards have similar utilities.

SoundBlaster SCSI

Q I recently purchased the SoundBlaster 16 SCSI-2 sound card, along with a NEC 3Xi CD ROM drive. Does the SoundBlaster's SCSI interface work as quickly as the one on the NEC 16-bit SCSI card? Is my SoundBlaster 16-bit only for audio, or does it also transfer SCSI data 16 bits at a time?
David Milkovich, Vestal, New York

A According to Creative Labs, the SoundBlaster's SCSI interface is indeed 16 bits wide—though you hardly need the speed for a peripheral as slow as a CD ROM drive. There's no need to consider a different card unless you're also using a SCSI hard disk, in which case you'll want a VL bus or bus-mastering EISA adapter.

Sampling Snafu

Q In the February *Help Line* ("How Many Megahertz Is Enough?"), Scott Spanbauer made an erroneous statement regarding the range of frequencies over which an audio board can faithfully capture and reproduce sound. An audio board's maximum sampling rate does affect the range of frequencies it can capture. The maximum frequency signal that can be faithfully sampled and reproduced is one-half the sampling rate. If you try to record a signal whose frequency is greater than half the sampling rate, it plays back incorrectly.

Also, while increasing the sampling rate does raise the maximum frequency that can be reproduced faithfully, it does not improve the resolution of the recording. Improved resolution is available only if more bits of data are stored—for example, 24 bits per sample instead of 16 bits per sample.
Steven A. Orth, Madison, Wisconsin

A You are one of several readers who raised this point, and you are all correct. According to a basic tenet of signal processing theory known as the Nyquist Sampling Theorem, a digital recorder can reproduce only signals whose frequency is half the sampling rate or less. Fortunately, most PC audio cards sold today sample at the same rate and with the same resolution used for audio CDs: 44.1 kHz and 16 bits per sample. This is sufficient to reproduce frequencies of up to 22.05 kHz—beyond the range of human hearing—faithfully. Since cards with these characteristics are now quite inexpensive, there's no reason to settle for less.

By Brett Glass

Brett Glass is a contributing editor for PC World. Help Line *welcomes your questions (see page 12 for contact information).*

POWERTIP no. 305

Windows StartUp Documents

Program Managers' StartUp group isn't just for applications. StartUp can automatically load documents, worksheets, and other data files that are associated with an app. Just drag the files' names from File Manager into StartUp to create icons for the files.

Karl Koessel
Senior Technical Editor

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SPREADSHEETS Q & A

Sorting Without Getting Lost in Excel

Q I have an Excel 4.0 worksheet that consists of two parts: a database, and a calculation area containing formulas that refer to database items. How can I sort the database records without messing up the cell references in the calculation formulas? Here's the problem: Say I've got a formula that refers to a value in the FLANGE record in cell B2 of the database. After I do a sort, the FLANGE data ends up in row 14. At that point, the formula should refer to B14, but it still refers to B2.

Paul Hunter, Jamestown, Colorado

A When you want to use spreadsheet database values in formulas, don't use direct references to database cells, or you'll end up with the problem you've just described. Instead, use lookup functions to pluck the items from the table.

For example, in **FIGURE 1**, the database is in A1:C7, the items you want to look up are in column E, and a sample lookup formula, =INDEX($A$1:$C$7, MATCH(E2,$A$1:$A$7,0),2), is shown in the formula bar.

In this formula, the MATCH lookup function locates the value from cell E2 (FLANGE) in the range A1:A7, and returns its position in the list, in this case 1. (The third argument in the MATCH function, 0, indicates an exact match, so the items in column A need not be alphabetized.) The INDEX function returns the value from the second column of range A1:C7, in the row determined by MATCH.

A formula like this is immune from the effects of sorting, because the MATCH function finds the FLANGE data wherever it's located. However, as you add records to the list, the ranges mentioned in the formula don't change to include the new data.

There's a more flexible version of the same formula that automatically accommodates changes in the database range. Before you enter this formula, though, you need to select the database range A1:C7 and choose *Data•Set Database.* (In Excel 5.0, select the range, choose *Insert•Name•Define,* enter the name **Database**, and click *OK.*) Now you can use the formula **=INDEX(Database,MATCH(E2,OFFSET(Database,0,0,ROWS(Database),1),0),2)**. The function OFFSET (Database,0,0, ROWS(Database),1) identifies the list for the MATCH function as a range that has an upper left cell offset 0 rows and 0 columns from the upper left corner of Database, that has as many rows as there are in Database, and that is one column wide. Now whenever you add new rows to Database, the range expands automatically to include these rows, and the lookup formula maintains the correct coordinates.

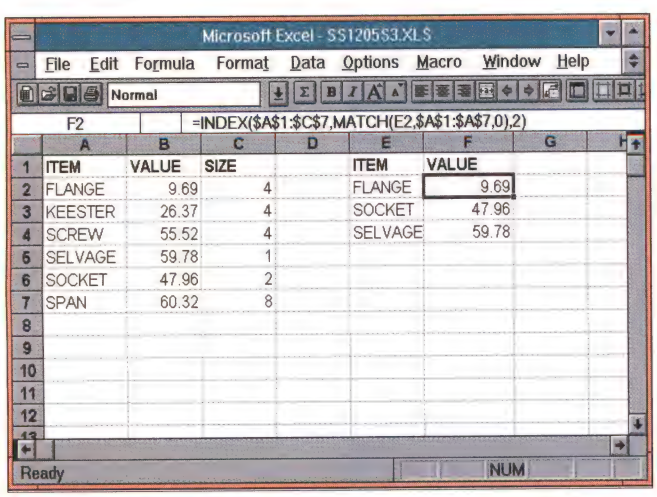

FIGURE 1: TO REFER TO DATABASE VALUES IN FORMULAS, use lookup formulas, instead of direct references to cells, to find the right data.

Creating a 'Page X of Y' Footer in 1-2-3

Q I'm using 1-2-3 release 3.4, and I have a file that comprises several sheets. When I print a report each sheet appears as a separate page, and I want a footer that displays the page number as 'Page 1 of 5.' Am I asking too much?

Bill Eddings, Birmingham, Alabama

A Almost. The solution I propose here for 1-2-3 release 3.4 will work only if the data from each worksheet fits onto a single sheet of paper.

First, set up your worksheets so each sheet prints on a separate page. In row 1 of every sheet except the first, use the command */Worksheet•Page•Row* to insert a page break. Then set a multirange print area (for this operation, use the cursor keys, not the mouse): Go to the top sheet and select *Print•Range•Set.* Position the cursor in the upper left corner of the range, press **<Period>** to anchor the range, and highlight the print area on the top sheet, beginning with row 1. Press **<Comma>**, then press **<Ctrl>-<Page Up>** to advance to the next sheet. Select the print area on that page, press **<Comma>**, and repeat the process for each successive sheet. When you're done, press **<Enter>** and select *Quit.*

Now for the page numbers: Go to the last sheet in your file and use */Range•Name•Create* to assign the range name **LASTPAGE** to a cell anywhere on that sheet. Return to the first sheet and enter the formula **+"Page # of "&@STRING(@CELL("sheet",LASTPAGE),0)** into a cell outside the print range. This formula constructs a footer string based on the sheet number where the cell named LASTPAGE resides. Name the cell **FOOTSTRING**. Finally, select */Print•Layout•Titles•Footer* and enter **\FOOTSTRING** to make 1-2-3 look in that cell for the footer text; then select *Quit.* When you print the file using the Wysiwyg commands, your page footers will appear on each sheet.

If any 1-2-3 wonks out there have a better way to do this, let's hear about it!

Note that Excel 5.0 and Quattro Pro 5.0 for Windows both provide built-in header and footer codes that will produce such a footer sans sweat. In Excel 5.0, select *File•Page Setup•Header/Footer,* click *Custom Footer,* then edit the Center Section to read **Page &[Page] of &[Pages]**. In Quattro Pro 5.0 for Windows, select *File•Page Setup,* and in the Footer text box, type **Page #p of #P.**

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Circle 49 on reader service card

Master Class: Getting Database Data Into Your Windows Spreadsheet

Last month I discussed the traditional method for bringing information from an external database into your spreadsheet: importing the raw data and parsing it into separate columns. Fortunately, in the brave new client-server world we're entering, your spreadsheet acts as a *universal client:* When you need numbers for an analysis, you simply reach out and grab copies directly from the database. In this month's Master Class, I'll show how this works with Excel 5.0.

From Server to Client

1-2-3 release 4.0 for Windows, Quattro Pro 5.0 for Windows, and Excel 5.0 all provide *query tools* that use database drivers to let you communicate with the database software, join related tables, and pick the fields and records you want to see in your spreadsheet. Each of the major spreadsheet vendors currently uses its own brand of database drivers; the drivers available for your spreadsheet determine which databases it can tap.

Excel 5.0's New Query Tool

Let's take a look at Excel 5.0's new query tool, Microsoft Query, using the demonstration dBASE order entry system supplied with Excel (although you can easily alter the model to use your own database files and fields). We'll walk through four main functions: accessing the database, establishing sort criteria, putting the data into your worksheet, and updating that data automatically when your database changes. Let's assume you want to work with all the orders accepted by one of your employees since June 1, 1989.

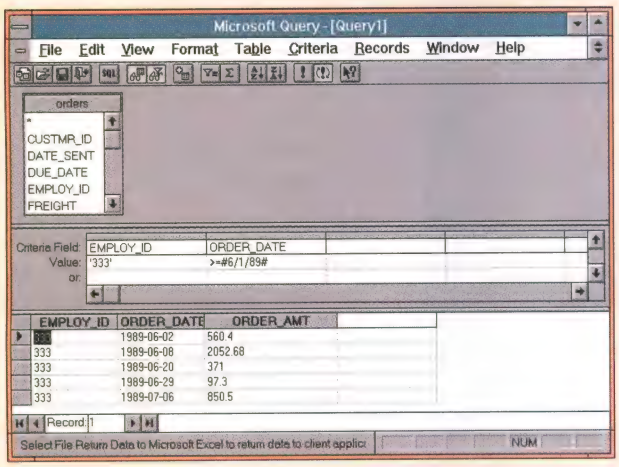

FIGURE 1: ACCESS SERVER DATA PAINLESSLY with the help of Microsoft Query, Excel's query tool.

In Excel 5.0, select *Data • Get External Data.* Excel launches Microsoft Query, which asks you to select the source of your data (that is, to choose the driver). Click *Other* and you'll see a list of the ODBC drivers installed on your system. Choose *dBASE Files* or another appropriate driver and click *OK,* then click *Use,* and you'll be prompted to select individual tables. To select the demo files, navigate to the directory \WINDOWS\MSAPPS\MSQUERY, select *Orders,* and click *Add,* then *Close.* Query places an image of the table's field structure in its document space.

Now you're ready to select the fields you need, which will become columns in your worksheet: Drag the field EMPLOY_ID from the Orders list located in the Table Pane into the empty rectangle in the Data Pane, the area at the bottom of the window. Repeat the process with ORDER_DATE and ORDER_AMT, and you've got the headings (but not all the detail) in FIGURE 1. If you want to remove a field from the image, click the column heading and press <Delete>.

But you probably don't want information on *all* the orders, so your next step is to set a filter. Click the Filter tool (right), and Query will display its Criteria Pane. To obtain all the sales performed by your employee since June 1, 1989, you drag the fields EMPLOY_ID and ORDER_DATE from the Order list into the first two empty column headings. Double-click the cell just below EMPLOY_ID on the Value row, and Query will display the Edit Criteria dialog with the proper field name already selected, and 'equals' as the Operator. Click the *Values* button and scroll the list of IDs to find and select *333,* which is the employee ID number. Click *OK.* Now go to the field underneath ORDER_DATE and double-click; from the Operator drop-down list box, select *is greater than or equal to.* Press *Values,* and for the Value field choose '1989-06-01'. When you finish, the list in the Data Pane will display only the relevant records, as shown in Figure 1.

Finally, to put the data back into your worksheet, select *File • Return Data to Microsoft Excel.* In the Get External Data dialog, click *OK,* and the selected data appears. When you need to capture a fresh snapshot of the currently selected records, select a cell inside the range that contains the data and then select *Data • Get External Data.* It's a lot faster than parsing.

Printing 1-2-3 4.0 Graphs With Multiple Elements

Q I've just moved to 1-2-3 release 4.0 for Windows from the DOS version of 1-2-3, and I love the new graphics. But there's one problem. I built a chart, then drew an arrow on top of it using Tools•Draw•Arrow. If I click the chart to select it, select File•Print (or Print Preview), and choose Selected chart, the graph prints just fine, but the arrow is nowhere to be seen. Can you help?

Chuck Fleenor,
Charlotte, North Carolina

A Your chart and arrow are two distinct graphical objects on the surface of the spreadsheet. When you click the chart to select it, you deselect the arrow, and vice versa. The trick is to select both: Click the chart, then hold down **<Ctrl>** and click the arrow. Now when you print, the dialog box refers to a 'collection' under Selected drawn object, and your printout includes both.

To select both the arrow and the chart automatically and ensure they print, move, and resize together, group them so they're treated as a single object: Select both as described above, then

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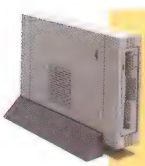

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Spreadsheet Toolbox

DS Lab

A spreadsheet is a rectangular grid of rows and columns, filled with text, numbers, and formulas, right? Not if it's DS Lab, a *visual spreadsheet* from DS Group. This innovative program lets you set up a diagram that represents your model in flowchart fashion. Instead of a screen full of numbers, you get symbols representing input values, constants, and variables (that is, formulas); arrows connecting the symbols represent interdependencies. This method makes the underlying logic of the worksheet easier to grasp.

DS Lab is especially adept at constructing what-if simulations that play out over time. If you set up a profit-and-loss scenario, for example, you can quickly generate a table of results that reflects the various values month by month for a year. Close links with Excel let you ship data between the two programs to simplify data entry, reports, and graphs.

DS Lab inverts the strengths and weaknesses of traditional spreadsheets: In 1-2-3, for instance, the logic of the model is below the surface, hidden in a web of interrelated formulas; in DS Lab the logic is easy to see, discuss, and manipulate. On the other hand, DS Lab submerges the data behind the model's visual elements, so it's not appropriate for record-keeping. But for playing the what-if game, DS Lab is a pretty sporty bit of gear. DS Group, $195; 800/828-8760. Reader service no. 713

select *Edit•Arrange•Group*. When you click the chart and select File•Print, notice that your grouping is confirmed under Selected drawn object as 'Group 1'.

Protected Sheets in 1-2-3 Release 4.0

Q Our department uses 1-2-3 release 4.0 for Windows to prepare quotes for our insurance underwriting business. I usually unprotect the data cells using Style•Protection, then use File•Protect•Seal File to prevent a careless cell entry from damaging a formula. But sealing the file means the user can't alter the worksheet at all: You can't change column widths, format a cell, or insert a row, and the command affects all the sheets. This is a sledgehammer—I need a dental pick.

William Dunham,
Charlotte, North Carolina

A Release 3.*x*'s worksheet protection command survives in 4.0's Classic menus. Press / to activate the menu, then select *Worksheet•Global•Protection•Enable*. It protects only the current sheet; you can change column widths and format cells, but still can't insert or delete rows or columns.

By Richard Scoville

Richard Scoville is a contributing editor for PC World *and a software training consultant based in Chapel Hill, North Carolina.* Spreadsheets *welcomes your questions (see page 12 for contact information).* ■

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WORD PROCESSING Q&A

Bordering the Table in WinWord 6.0

Q I have a problem with Word 6.0 for Windows' table feature. I'm trying to create a telephone logging form so employees can manually log each call. I've created the table and added text as labels in the top row. The problem is, when I print the forms, the text prints fine but the grid lines disappear. I'm probably missing some minor step, but I can't figure it out. I hope you can help.
William Johnson, Cleveland

A Your problem is one that puzzles a lot of WinWord users. Since grid lines appear around a table on the screen, you'd think they'd print, but those lines are on the screen just to help you see the table's structure. You'll have to take a few extra steps to get those lines on paper. Here's what to do:

After setting up your table the way you want it, position the cursor anywhere inside the table and select *Table•Table AutoFormat*. This new feature in WinWord 6.0 makes it easy to apply lines, shading, and borders to any table. Since you're looking for a simple grid layout, scroll down the Formats list in the Table AutoFormat dialog box (see **FIGURE 1**) until you get to the layouts called Grid 1, Grid 2, and so on. As you click on a format in the list, you see what it looks like in the Preview window. When you find the grid style you want, make sure the *Borders* check box is marked, unmark the *AutoFit* box, and click *OK*. That's all there is to it.

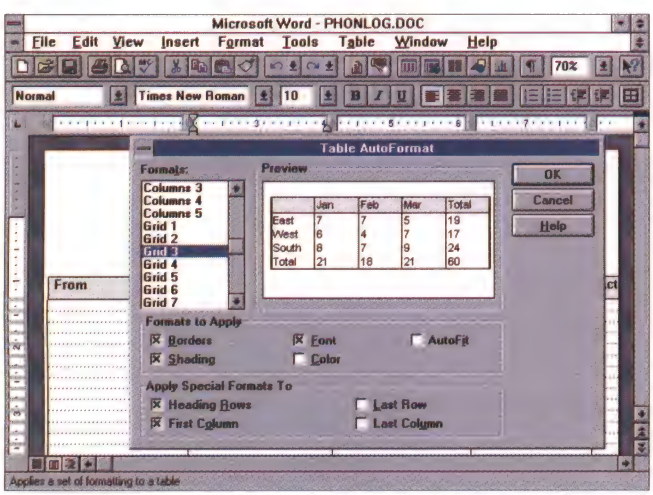

FIGURE 1: ADD BORDERS, SHADING, AND MORE to any table with WinWord 6.0's Table AutoFormat feature.

Wrapping Text Around Graphics in WinWord 2.0c

Q I recently ran into a problem in Word 2.0c for Windows that I just can't seem to fix. I decided to spice up one of my documents by adding some graphics. I was able to import a clip art image with no problem. But once the picture was on the screen, the space to the right of the image was completely blank. I expected my text to wrap around the graphic image, but it didn't. Surely this isn't the way this program is supposed to work. So what's the story?
Terry LeRoy Coleman, Santa Monica, California

A The way Word 2.0 for Windows handles imported graphics is not very intuitive. When you first import a graphics file, WinWord treats it like a paragraph of text—that's why you end up with the blank space. But you don't have to leave things that way. Here's how to make your graphic images fit in.

First, be sure that you're in Page Layout view. After importing the graphics file as you did before (using the Insert•Picture command), click the image once. A set of black lines punctuated by sizing handles (little black squares) appears around the image. Select *Insert•Frame* to enclose the graphic in a frame. Your text wraps around the frame and therefore the graphic—which is what you expected when you first imported the file.

With the picture now in its frame, you have complete control of the way it appears on the page. You can size or reposition the image simply by dragging on different parts of the frame with your mouse. For more exact control or to modify other frame attributes (such as text wrapping), click on the picture again (if it's not already selected), select *Format•Frame*, and then make your changes in the resulting dialog box.

USER GROUP TIP

Special Character Tips in Word 6.0 for Windows

Use Word for Windows' shortcut keys to insert special characters into your documents. For a trademark symbol, press <Ctrl>-<Alt>-T. To insert a registered trademark symbol, press <Ctrl>-<Alt>-R. Press <Ctrl>-<Alt>-C for a copyright symbol. To use other symbols or special characters, select Insert • Symbol, select either the special character or symbol you want, then click Insert • Close.

Rick Schummer
Sterling Heights Computer Club

Has WordPerfect 6.0 for Windows Lost Its Mind?

Q I've been using WordPerfect for Windows for a while now, and despite some initial problems, it's working pretty well overall. I've experimented with customizing my tool bars along with other interface options and have been impressed with the new version's flexibility. But today, when I tried to start the program, it seems to have lost its mind. The tool bars have all changed, the program can't find its own spelling checker or macro files, and the display in the File menu (which used to show the last four files I edited) is gone. What's going on, and how can I keep it from happening again?
Monica Sampson, Baltimore

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A Your problems are the result of a serious bug in the initial release of WordPerfect 6.0 for Windows. The program has inadvertently corrupted an essential configuration file, WPCSET.BIF.

Ideally, of course, you'd have a recent backup of WPCSET.BIF to restore. If this isn't the case, however, your only choice is to delete or rename the file.

To do this, exit WordPerfect, and then use the Windows File Manager to locate the file. (It should be in the directory that you specified for initialization files when you installed WordPerfect; the default directory is C:\WPWIN60.) Highlight the file name, and then select *File•Delete*. You can now restart WordPerfect, which should run normally.

There's just one problem: The program reverts to its factory-set defaults and you lose all your customized tool bars and icons. If this sounds disastrous, you're right. Fortunately, you have an alternative. An interim release of WordPerfect for Windows—version 6.0a—stabilizes the program, so this problem should not recur.

Registered users can obtain the interim release at no charge by calling the WordPerfect order line at 800/321-4566. If you didn't send in your registration card, the operator can register you when you call. Have your license number ready when you call—you'll find it on the registration form or by selecting *Help•About* in the program.

Weird Smart Quotes in WordPerfect 6.0 for Windows

Q I use WordPerfect 6.0 for Windows' SQTOGGLE.WCM macro to turn on the program's Smart Quotes feature. This converts the ugly single and double quotation marks of the keyboard into more attractive typographic symbols. But there's a problem: Although each font contains its own versions of these quotation marks, designed to look good with that font's characters, WordPerfect uses the same quotation mark no matter which font I've selected. Why does WordPerfect substitute its own characters, which don't match the font I'm using? Is there a way to fix this?

Clarisse Meyers, Boston

A I can't explain why WordPerfect chose to use its own characters for this function instead of the quotation marks in each font, but I can tell you how to fix the problem. Before you get started, though, you'll need two macro files, SQCONFIG.WCM and SQTOGGLE.WCM, which WordPerfect should have installed automatically. If you performed a custom installation and didn't install the included macros, you'll have to rerun WPWin's install program to get them.

Once you have the macros, select *Tools•Macro•Play*. Click the file folder button next to the Name box, choose *SQCONFIG.WCM* from the list of macros in the Select File dialog box, and click *OK*. Click *Play* when the Play Macro dialog box reappears. You'll see the Configure Smart Quotes dialog box, where you can set up the way you want Smart Quotes to work. The cursor automatically jumps to the Single box in the Open Quotes frame.

Make sure that <Num Lock> is on, and then hold down **<Alt>** while you type **0145** on the number pad; that's the ASCII code

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for the opening single quotation mark in all normal fonts. Press **<Tab>** to move to the Double box, and then hold down **<Alt>** while you type **0147** to insert the opening double quotation mark. Press **<Tab>** again, and then hold down **<Alt>** while you type **0146** for the closing single quotation mark. Press **<Tab>** once more, then hold down **<Alt>** while you type **0148** to insert the closing double quotation mark. Select the options you want in the check boxes (in most cases, it's best to turn on all the options), then select *OK* to save your new settings.

If you don't already have Smart Quotes toggled on, run the SQTOGGLE.WCM macro (select *Tools•Macro•Play* and select it from the list). WPWin will now remember your settings and start up with Smart Quotes turned on, until you run SQTOGGLE.WCM again to turn the feature off.

Now you need to take just one more step: Select *File•Preferences,* then double-click the *Environment* icon. In the *Environment Preferences* dialog box, select the *Code Page* button. In the *Code Page Preferences* dialog box, scroll down the Windows Code Page list and choose *1252 Windows US Standard.* Click *OK* twice, then click *Close* to return to the normal editing screen.

Lining It Up in Ami Pro

Q Most of the documents I create in Ami Pro 3.0 include several frames containing graphics. These frames need to be identical in size and must line up precisely at the left margin of the page, but they may vary widely in their vertical spacing. While sizing and positioning graphics frames is easy with the mouse, that method isn't very precise. Is there an easy way to make the frames the same size and line them up correctly?
Anna Thomas, Sacramento, California

A Although Ami Pro doesn't offer a snap-to-grid feature, it does give you a way to specify the size and position of frames precisely. Here's how to get your multiple frames lined up and identically sized:

Start by creating your frames as you normally do, with the *Frame•Create Frame* command. Size and position the frames approximately on the page and insert your graphics files using the *File•Import Picture* command. When you finish inserting your frames and graphics, left-click on the first frame in your document to select it. Then right-click the selected frame to call up the Modify Frame Layout dialog box, and click the *Size and Position* option. In the Size area, set the size for this first dialog box, then set the 'In from left' measurement to match your page margins. (If you don't know what your margins are, check the settings on the Modify Page Layout dialog box by selecting *Page•Modify Page Layout.*) Before clicking *OK,* however, make a note of the settings you change.

Repeat the process for each frame in your document, setting the Size and 'In from left' measurements to match those of your first frame. Everything will line up perfectly, on both the screen and the printed page.

By George Campbell

George Campbell is a contributing editor for PC World. Word Processing *welcomes your questions (see page 12 for contact information).*

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WINDOWS Q&A

Keeping File Manager Company

Q Is there a way to launch another application automatically every time I start File Manager? I have a handy "trash can" utility that I only use when File Manager is running.

Sarah Thiery, Burlington, Connecticut

A There is indeed. Simply select the File Manager icon in Program Manager and either press **<Alt>-<Enter>** or select *File•Properties*. In the Command Line box, place the cursor to the right of WINFILE.EXE, then type a space followed by the path and name of the program you want to launch with File Manager. When you're finished, the Command Line should look something like this: WINFILE.EXE C:\UTILITY\TRASHMAN.EXE.

You can use this technique with data files as well. Do you use certain macros only with File Manager? List the appropriate REC file on the Command Line as described previously—for example, WINFILE.EXE FILEMAN.REC. Since REC files are associated with Recorder, double-clicking a File Manager icon will launch File Manager and Recorder and will load (but not run) the appropriate Recorder macros.

Just remember, this trick only works with File Manager—and it can launch only one program or data file.

Do-It-Yourself PIM

Q I use Windows' Cardfile utility to store phone numbers and addresses, and I especially like the auto-dial feature. However, the cards don't provide enough room for writing lengthy notes. Is there some way to add a phone log to Cardfile, or must I buy a full-fledged personal information manager?

Tricia Nugent, Albuquerque, New Mexico

A Windows comes with all the pieces of a stripped-down PIM. It's up to you, though, to stitch them together. The thread is Object Packager, which taps Windows' OLE talents. Object Packager lets you add an icon to each card that, when double-clicked, opens a Notepad file with the current date and time automatically inserted.

Here's how: Launch Notepad, type **.LOG** at the beginning of the first line (the period and capitalization are necessary), and press **<Enter>**. This turns the file into a log file, compelling Notepad to insert the current time and date at the end of the file every time you open it. Save the file as **PHONELOG.TXT** and close Notepad.

Next, link an icon to PHONELOG.TXT. Launch Object Packager, select *Edit•Command Line*, and type the phone log file's path and name—for example, **C:\DOC\PHONELOG.TXT**. (If File Manager associates the TXT extension with something other than Notepad, you must add Notepad's location as well—for example, **C:\WINDOWS\NOTEPAD.EXE C:\DOC\PHONELOG.TXT**.) Click *OK*, and the path and name will appear in Object Packager's Content window. To assign an icon to the file, click the *Insert Icon* button, select an icon from the list, and click *OK*. Finally, select *Edit•Copy Package* and exit Object Packager.

To finish the job, launch Cardfile, open the desired card file, and select the card that needs a phone log. Select *Edit•Picture* so Cardfile can receive images and OLE objects, and choose *Edit•Paste* to drop the icon onto the card. Drag the icon to a convenient location, and save the card file.

That's it. The next time you need to jot down notes during a phone call, just double-click the icon and your Notepad phone log will pop up, ready to do your bidding. Just bear in mind that Cardfile must be in Picture mode, and of course don't forget to save the Notepad file

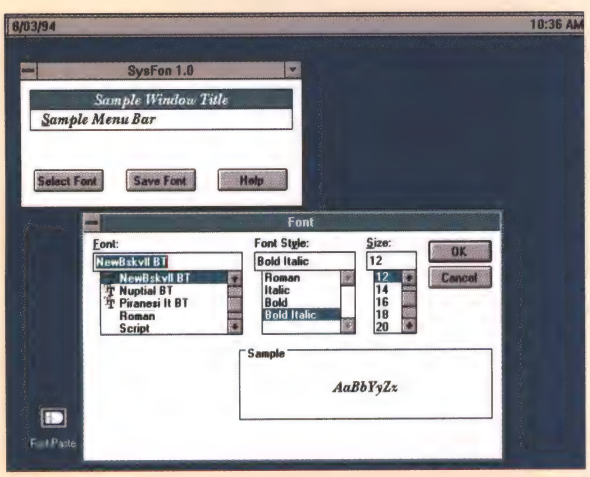
USER GROUP TIP

Using WinHelp

You don't need to be in a Windows program to view its help (HLP) files; you can use Windows Help directly. In Program Manager, select File • Run, type WINHELP, and click OK. In WinHelp, select File • Open, select the help file you want to view, and click OK.

John Monge
Sterling Heights Computer Club

Windows Toolbox



If you're tired of the drab Windows system font that adorns your title bars and menus, help is on the way. SysFon 1.0 can transform nearly any Windows-compatible font—from TrueType to ATM PostScript fonts—into a bit map dedicated to this mundane chore. To convert a font, you merely click a button, pick an installed font off a list, and specify the size and style. SysFon displays a sample title bar and menu. Click another button to accept the change, restart Windows, and your title and menu bars are transformed. Best of all, SysFon is a free, public-domain program. It's available as SYSFON.ZIP from PC World Online and other online services.

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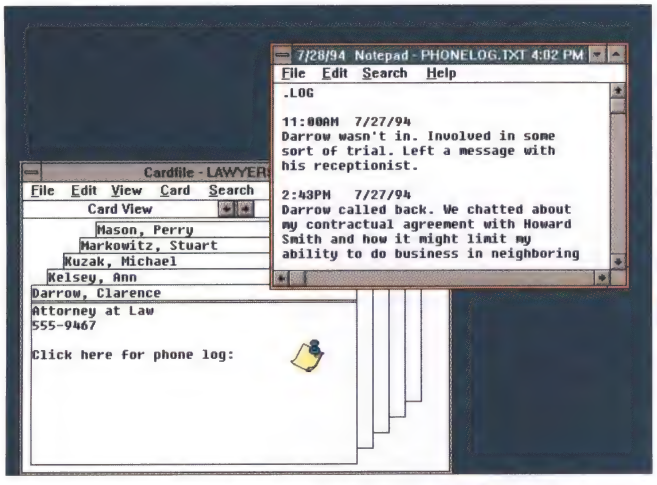


NEED AN INSTANT PIM? With Object Packager, you can link an auto-dating Notepad with Cardfile.

when you're done. To create a log file for other cards in your file, simply repeat these steps, creating a unique Notepad TXT file for each one. If you're asked 'Update Embedded Object?' when you select another card, click *No*. You may also have to delete older log entries periodically, because Notepad can't handle files over 45K.

A final tip: If you need quick access to a calendar while you're on the phone, create a separate card called **Calendar** and stick an Object Packager icon on it for launching Windows' Calendar program.

Ban the Banner

Q I use Windows on a Novell network. When I print to the network printer, a cover sheet prints as well. How can I stop Windows from wasting paper?
Ed Green, Madison, Wisconsin

A Easy. Start Control Panel and double-click the *Printers* icon. Select the printer from the Installed Printers list and click *Connect*. In the resulting dialog box, click *Network*, then *Options* in the dialog box after that. Uncheck *Enable Banner*, click *OK*, and close the remaining dialog boxes.

Customizing Control Panel

Q I use Norton Desktop 3.0 for Windows because it lets me customize just about everything on my desktop. But I can't seem to alter the icons in Control Panel. What's wrong?
Shelly Wilson, Enid, Oklahoma

A Dig a little deeper into Norton's tool chest, and you'll find the Icon Editor, which can alter just about any icon in Windows. Changing Control Panel icons is a little trickier, however, because they aren't embedded in the CONTROL.EXE file, but rather in various CPL files found in Windows' SYSTEM subdirectory. Although the Icon Editor is only designed to open ICO (icon), NIL (Norton Icon Library), DLL (Dynamic Link Library) and EXE (executable) files, it will grudgingly accept CPL files as well.

Here's what to do: First, make backup copies of all the CPL files you plan to alter, by copying them to other names or directories in File Manager. Then you launch the Icon Editor and choose *File•Open*. Log on to the SYSTEM subdirectory, type ***.CPL** for the File Name, press **<Enter>**, and select the desired CPL file from the list. MAIN.CPL contains Control Panel icons for Color, Fonts, Ports, Mouse, Desktop, Keyboard, Printers, Date/Time, International, and Network. To change the 386 Enhanced icon, select CPWIN386.CPL; to change the Drivers or Sound icons, select DRIVER.CPL or SND.CPL respectively. (If your Control Panel has a MIDI Mapper icon, it's in the file MIDIMAP.DRV). Click *OK*, and an error message pops up noting that the file extension isn't kosher. Click *OK* to ignore this warning.

The icons in the selected file now appear in a separate window. Pick the icon you want to change, click *Modify*, and retouch the icon with the paint tools or replace it by choosing *File• Import Icon* to display icons in other files. When you're finished, click *Replace*, then select *File•Save* from the Icon Editor's main menu. The next time you start Control Panel, you'll see your new icon in place.

Note: Readers who don't have Norton Desktop for Windows or another icon editor can customize Control Panel icons with Impact Software's Icon Manager 3.4, available as ICM34.ZIP on PC World Online and other online services.

- **Icon Manager 3.4;** Impact Software; 909/590-8522, 909/590-2202 (fax)

The Price of Speed

Q I use Windows for Workgroups 3.11 with 32-bit disk and file access enabled. But when I try to unerase a file with the Windows version of DOS 6.*x*'s Undelete utility, an error message says Interrupt 26 is blocked to preserve volume integrity. If I disable 32-bit file access (but not disk access), Undelete works fine. Is this a known problem?
Betsy Getreu, America Online

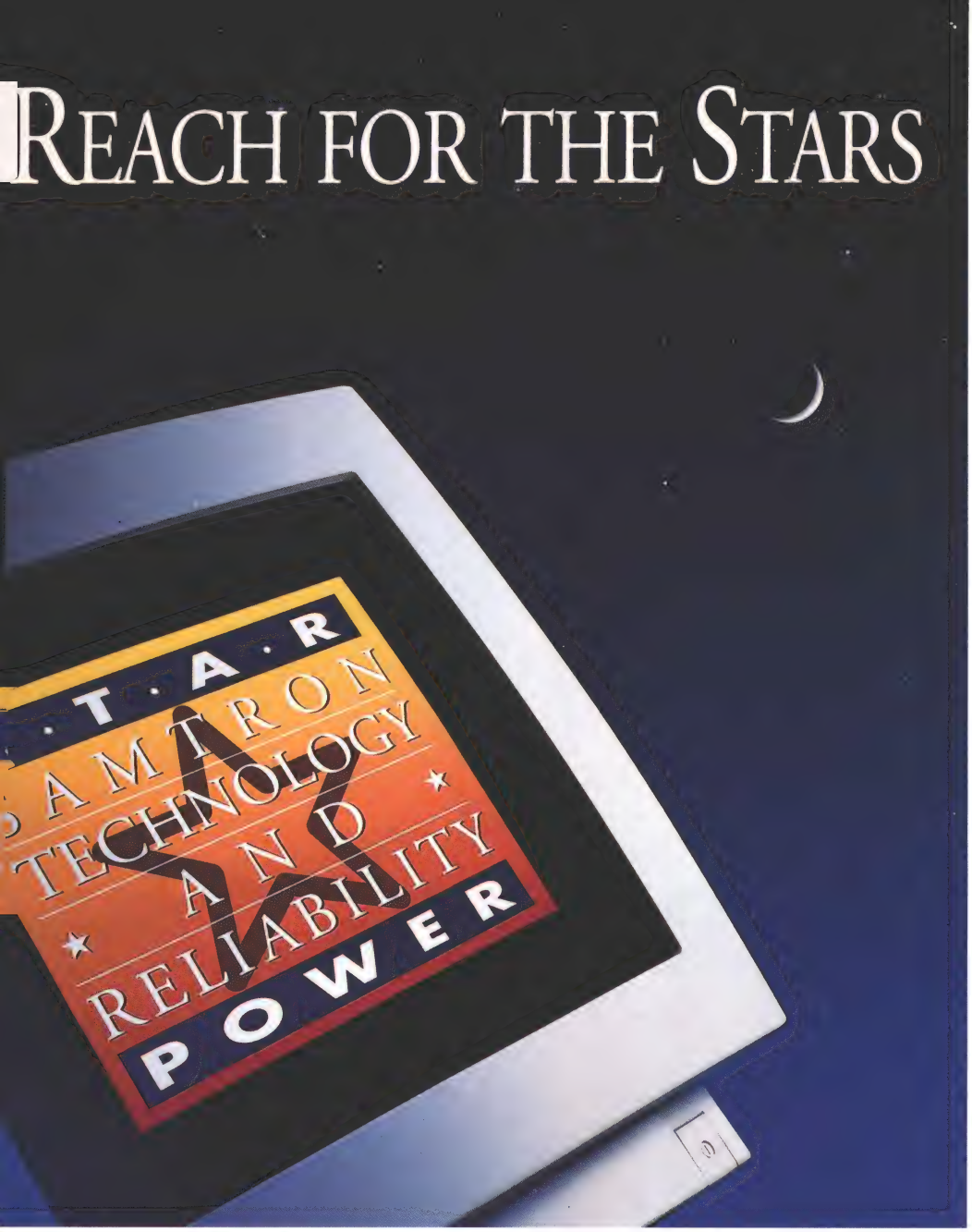
A Alas, it's true. Many disk utilities—including Microsoft Undelete for Windows, Vertisoft's SpaceManager, Norton SmartErase for Windows, Norton SpeedDisk for Windows, and Norton Disk Doctor for Windows—access the hard drive directly via Interrupt 26. But when 32-bit file access is on, programs can only get to the disk via Windows' drivers. Your only choices are to turn off 32-bit file access or exit Windows and run a DOS undelete program.

One quick way to disable 32-bit file access is to exit Windows and restart by typing **WIN /D:C** at the DOS prompt. While this allows you to run SpaceManager, other Windows-based disk utilities still think 32-bit file access is active, which means you'll have to turn off 32-bit file access in the Control Panel, exit and restart Windows, run the undelete utility, turn 32-bit file access on, then exit and restart Windows again. The easier solution is to exit Windows and run a DOS undelete program. Fortunately, DOS 6.*x* comes with a DOS version of Undelete, and Symantec ships DOS equivalents of Norton Desktop for Windows' file utilities.

By Scott Dunn

Scott Dunn is a contributing editor for PC World *and coauthor of* 101 Windows Tips *(Peachpit Press, Berkeley, California, 1992).* Windows Q&A *welcomes your questions. See page 12 for contact information.*

REACH FOR THE STARS



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OS/2 Q&A

Clarifying Errors

Q OS/2 displays command line errors with code numbers, something DOS never did. How can I turn the numbers into information?
Chuck Richards, Minneapolis

A OS/2 gives you an error code if you enter a command it doesn't understand. For example, if you enter DRI for a directory listing instead of DIR, you'll get the error message 'SYS1041'. Just type **HELP SYS1041** at the command prompt, and you get a whole screenful of useful information telling you what the problem was and how to fix it.

Fixing INIs

Q I was playing with a shareware INI file editor and managed to delete the Shutdown command on my desktop's menu. How can I get it back?
Abraham Waranowitz, Lower Marlboro, Maryland

A The easiest way to get the command back is to restore your OS/2 INI file from a backup. If you don't have a backup, let this be a lesson to you.

Okay, enough lecturing. You can use OS/2's MAKEINI utility to re-create one or both of the default INI files that come with OS/2. The new files won't have any changes you or your programs have made, but at least you get back what you lost. Boot OS/2 from the Installation Diskette and put Diskette 1 into drive A: when prompted. Wait until you get the 'Welcome to OS/2' screen (it will seem like an eternity), then press **<Esc>**. At the OS/2 prompt, log on to your boot drive's OS2 directory and enter the command **MAKEINI OS2.INI INI.RC**. (If you also messed up any printer or font information, enter the command **MAKEINI OS2SYS.INI INISYS.RC**, too.)

Remove the floppy from drive A: and reboot. You now have the default INI files that come with OS/2.

OS/2's INI files are binary, which means your programs can access them fast, and novice users are less likely to muck around in them and cause serious damage. But if you do muck around and cause serious damage, it's harder to set things right again. Editing OS/2 INI files isn't a good idea unless you really know what you're doing.

If you decide to edit an INI file, make a copy first. A simple COPY command or <Ctrl>–right-drag gives you a backup in case something unexpected occurs. If you change your configurations frequently, you might want to buy DeskMan/2, a utility from Development Technologies that keeps copies of your desktop settings, folders, and objects and lets you restore them easily.

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Lost and Found

Q I've organized my desktop with lots of folders inside other folders. Most of the time it's a great system, but occasionally I lose track of where I put a program or file object. Is there an easy way to find these items?
David Post, Dallas

A You can use the WorkPlace Shell's Find feature to locate an object. If you launch Find from the desktop, it will search all of your folders, but you can speed up the search by starting at a folder—one you think has the object in a subfolder. Right-click on the folder or desktop, and in the resulting menu select *Find*. In the Name text box, type in the name of the object you're looking for. You can use the * and ? wild cards; for example, to find a Borland Paradox object, type 'Borland *'. Click the *Search All Subfolders* radio button, then click the *Find* button or press **<Enter>**.

After searching, OS/2 displays a folder called Find Results, containing all the objects that match your search criteria. Notice that the objects in the Find Results folder have names in gray text, indicating that they're shadows of other objects. To go immediately to an object's original folder, right-click the object and choose *Original•Locate*. Once you've found the original folder, you can delete the Find Results folder by closing it and dragging it to the shredder. Since the objects in it are all shadows, there's no danger of deleting the originals.

By Lou Miranda

Lou Miranda is a PC World *contributing editor and an OS/2 programmer and consultant based in Minneapolis–St. Paul. OS/2 welcomes your questions. See page 12 for contact information.*

From Windows to OS/2

Information and Drive Folders

If you're used to Windows' File Manager, OS/2's drive folders can seem alternatively too simple or too complex. When you open a drive folder to look at what's inside, you get a tree view of the disk's directories (unless it has no subdirectories). When you open a directory folder, you get an icon view of its files. Neither view gives you many details.

If you need more information about a single file, right-click it, then click the Open arrow and select *Settings*. In the Settings notebook, choose the *File* tab. It gives you three pages of detailed information about the file, including a comments option that's not in Windows.

How do you view details on *all* the files in a folder? Right-click on the background of the folder, click the Open arrow, and choose *Details View*.

To make the Details View a drive's default, right-click the drive's icon, then click the Open arrow and select *Settings*. Select the *Menu* tab in the notebook. On the Menu page, select *~Open*, then click the *Settings* button. Under Default Action, choose *Details View*, then click *OK*. Your file views for that drive will be detailed from then on.

DATA MANAGEMENT Q & A

Crazy Counts With dBASE

Q I'm having problems with dBASE IV. First, if I query a data file I've indexed with the Unique option turned on, shouldn't I get only the unique records? Well, I get all my records—whether they're unique or not. **[Editor's note:** To index with Unique on, turn on the 'Display first duplicate key only' option when you create the index.]

Also, I'm using that same file in a report as the child in a one-to-many relationship. A count field in the report's summary is supposed to give the number of records in the child file, but sometimes it returns a count of the parent's records instead. Is there some way to get consistently correct results?
William Bolza, Wilmington, Delaware

A The first problem is easy to explain: When you launch a dBASE query, it ignores the indexes that you've already picked for the file, so you have to reassign your index from within the query. When you view your data from inside the query, simply select *Organize•Order records by index* and the name of your Unique index. One caveat: For some strange reason known only to programmers who like to torture users, the 'Order records by index' option isn't available within a brand-new query. You have to exit the query, naming and saving it as you do so, then reenter it before you can pick an index.

Reports add to the confusion because they *don't* ignore the indexes that you have already picked. To get an accurate count, make sure that the child file is not ordered on a Unique index before you run your report. Order it on an index where the Unique option is turned off, or select *Organize•Order records by index•Natural Order* to order it on no index at all.

Upside Down in Paradox for Windows

Q I have a Paradox for Windows report grouped on an ID field. The second field in the report table is a date field. Is there a way to show the records sorted first by ID and then by descending date order (with the most recent dates first)? Also, can I create an index that displays records in descending order?
Michael Trombetta, Manhasset, New York

A Believe it or not, Paradox for Windows offers no easy way to sort records in a report. You should be able simply to bring up an order dialog box; instead, you must go to the trouble of adding a group band to your report design, then hiding the band.

In the Paradox report designer, use *Report•Add Band* to add a second group band to your report, based on the date field. Once the band is in place, right-click it, and select *Sort Order•Descending* from the resulting menu. You don't want the report to *look* as if a band is there, so click the field object in the group header and press **<Delete>** to get rid of it.

But wait, there's more! Click the date group header itself, then drag down the line that marks its top until it touches the top line of the All Records band. Then click the group footer, and move the line below it up. This should get rid of any unwanted spaces between the records. You might want to view your design with data at this point. If you still get undesired spaces between your records, check the Record or Table area to see whether it has any space that you can drag away.

If you created your report with the default Tabular style, you're not done yet: Whenever the date changes, Paradox will draw a new table, making a dreadful-looking report. To get rid of this unsightly mess, right-click the table object, choose *Detach Header,* then drag the header up into the ID group header (the one above the date group header that you're trying to hide). Then erase the grid by right-clicking the table again and selecting *Grid•Grid Style•None.* It may be a lot of bother, but at least you will end up with a report that's sorted the way you want.

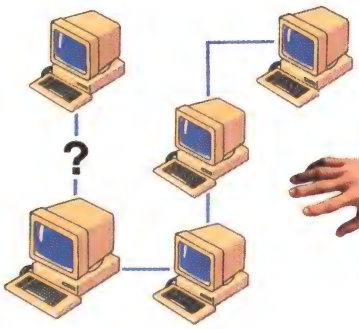
On to your next question: You can't index a table in descending order, but there are other ways to change a table's apparent order. You can physically sort your table with the *Table•Sort* command, or you can create a query with a descending check mark in your date field. But if you want to edit your table while it's "upside down," neither of these solutions works. That's because queries always put their results in a new table, where editing won't affect the original (sorts often do this, too).

The work-around is to create a form attached to a query. First, create a query sorted as you want it. To sort a field in descending order, click and hold down the box next to the field's name in the query design window, and select the check mark next to the down arrow. Then select *Properties•Answer Table•Sort,* and add all the fields you want to sort—in the order you want to sort them—to the Sort By list. Then click *OK* and save the query.

Next, create a form based on the query rather than on the table. Use *File•New•Form;* in the Data Model dialog box, change the Type to *Queries,* and select the query you saved earlier. In the Design Layout dialog box, you may want to change the Style to *Tabular* before clicking *OK* to open the Form window. When you press **<F8>** or click the *View Data* button, you should see your records "upside down."

Re-sorting Invoices in Paradox for DOS

Q I use a relational database, set up in Paradox 4.5 for DOS, to enter and print invoices for my mail-order business. My master table is called INVOICES; it contains information such as customer names and addresses, shipping instructions, and so on, and is keyed on an Invoice # field. I keep invoice line-item information in another table called INVLINES, which is keyed on Invoice # and Line #. My invoice form links these two tables in a one-to-many relationship. This scheme works wonderfully for creating new



Find out why your PC won't talk to your LAN. And what you can do about it.

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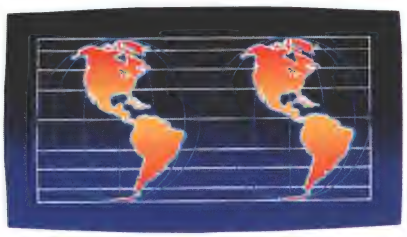

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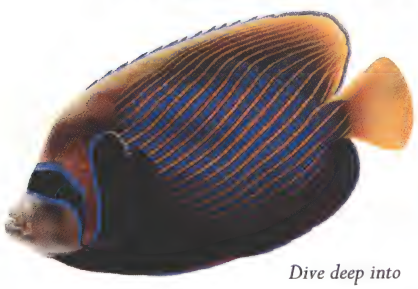

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For a low one-time membership fee and $8.95 a month, you can use our most popular services as often as you like: news, sports, weather, shopping, reference materials, our electronic mail service of up to 60 messages a month, and more. Plus there's a whole universe of other, extended options available at nominal additional charges. Your first month on CompuServe will be free, and we'll give you a $25 usage credit to explore our extended services.

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Circle 33 on reader service card

invoices, since Paradox automatically sorts the records in Invoice # order. This means that I can easily go to the last record in INVOICES and see what the next Invoice # should be.

Can I use this same form to view invoices in alphabetical order by the Customer Name field? In some instances, this alternative would be a great deal easier than viewing them by Invoice #. For instance, when customers telephone with questions about their orders, I would like to be able to page through their invoices without having to search the entire database by name.

Kelly McGuire, Evanston, Illinois

A It's easy to change the order in which Paradox displays data. First, bring up your INVOICES file in the form you described. Then select *Image•OrderTable*, and move the cursor to the Customer Name field when prompted to select a column. When you press **<Enter>**, Paradox displays a dialog box showing the Customer Name field; press **<Enter>** again to sort your records by that field. (The first time that you select a field for sorting, you will be asked to confirm your choice before Paradox creates a new index.)

Be aware that if you turn on Edit mode by pressing <F9> or selecting Modify•Edit, Paradox reorders the records by the default order—Invoice # in your case. If you want to edit your data while it's in Customer Name order, you can get around this limitation by using CoEdit mode—simply press **<Alt>-<F9>** from within your re-sorted form. In CoEdit, Paradox can keep your records in name order while allowing you to change your data.

Note: If you want to order your records by a combination of fields, such as Customer # plus Date, use *Modify•Index* to create a named secondary index based on both fields. The resulting dialog box is self-explanatory. The next time you select Image•Order Table, this index will appear in the resulting dialog box. You can then choose how you want your records ordered.

Guaranteed Unique Paradox for DOS IDs

In *PC World*'s February 1994 issue, I said you could create unique IDs in a Paradox table by adding a SETKEY command to your INIT.SC file ("Adding IDs to a Paradox Table"). I gave the example SETKEY 14 [ID] = RECNO(), which tells Paradox to put the current record number in a field called ID if you press <Ctrl>-N while editing a table.

As John-David Yoder pointed out over CompuServe, my suggestion will consistently give you unique IDs only if you never delete records from your table. To make sure you can't possibly reuse an ID, use this command instead: **SETKEY 14 [ID] = CMAX(TABLE(),"ID")+1**.

This works for any record except the first one you add to a table. You have to enter that one yourself.

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World *and the author of* The Paradox 4.0 Handbook *(Bantam Computer Books, New York, 1992).* Data Management *welcomes your questions. See page 12 for contact information.*

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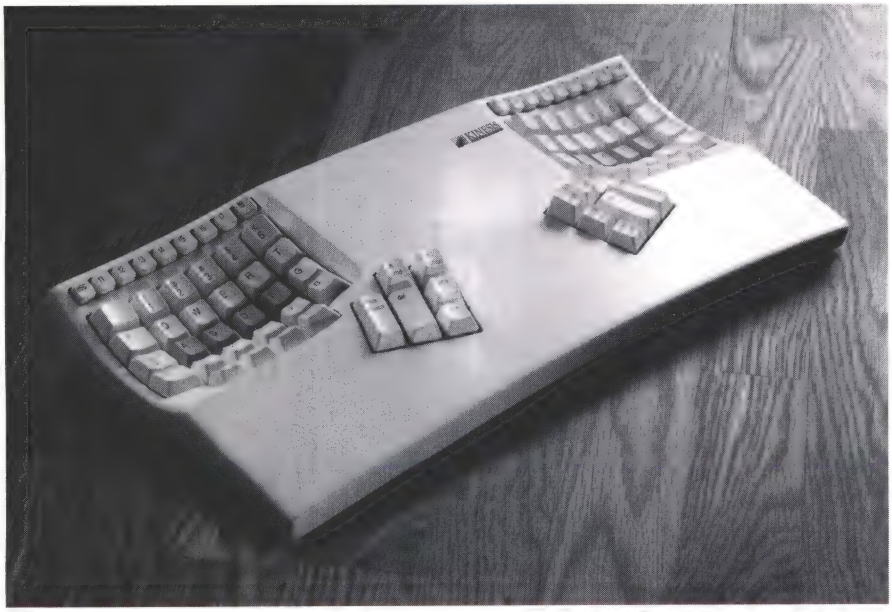

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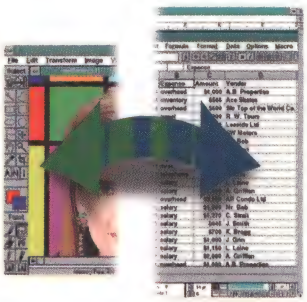
Paul - Manager/Parent :

"I needed a performance boost for my PC. It took a long time for my charts and presentations to appear on the screen. The colors were flat and limited. And my son's games ran slowly. But, I wasn't ready to buy a whole new system.

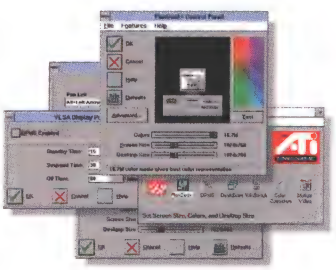
"Fortunately, I got great advice. For *just $299****, I got ATI's GRAPHICS XPRESSION. It revived my whole system.

"My friend had one. Windows snapped open quickly. Charts popped up on his screen. The *blazing speed,* 37M Winmarks*, was incredible. He said it offered *best value for price/performance.* And the improvement in color graphics and detail were most impressive.



WinSwitch changes color and resolution without leaving Windows

"Then, he showed me the features. WinSwitch allowed him to switch between true color mode or high resolution mode without exiting Windows. And ATI's FlexDesk+ software gave him *total control* over color, desktop size, resolution and even motion video acceleration.



FlexDesk+ easy control of desktop settings

"Finally, he told me it was the only affordable 64-bit accelerator for my ISA system. I rushed out to buy one. *Installation was easy.* There were no switches to set and the software guided me through the installation process. And I was amazed, it even came with a complete set of drivers for Windows, Windows NT, OS/2, CAD and DOS.

"Best of all, my PC now runs much faster in Windows, DOS and games. I almost never see that Windows hour-glass. GRAPHICS XPRESSION. At only $299, it is still great advice."

"I got the advice I needed."

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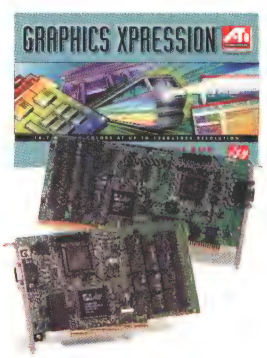

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PUBLISHING & PRESENTATIONS MAKEOVER

PC World's Most Wanted

David Brickley, who designs our *Publishing and Presentations* document makeovers, was at the post office when he saw the "Wanted" poster shown below. Something about it struck him as wrong: He realized it was a perfect redesign candidate.

Brickley called FBI headquarters in Washington, D.C., with a proposal: If they let us use their poster for a makeover, we'd tell 1 million readers about their felon. The Feds agreed to the deal, provided we make it clear they aren't endorsing our design. Brickley promptly set to work.

Capture Their Attention

The Feds did one thing right in designing their poster: They made it easy to recognize. That's the first priority of any design: to tell viewers what they're looking at. In this case, splashing the words "Wanted by FBI" across the top makes the poster's purpose pretty clear.

The rest of the poster needed further revision. To see why, hold this magazine at arm's length and attempt to read the original poster. What can you make out? Probably not much.

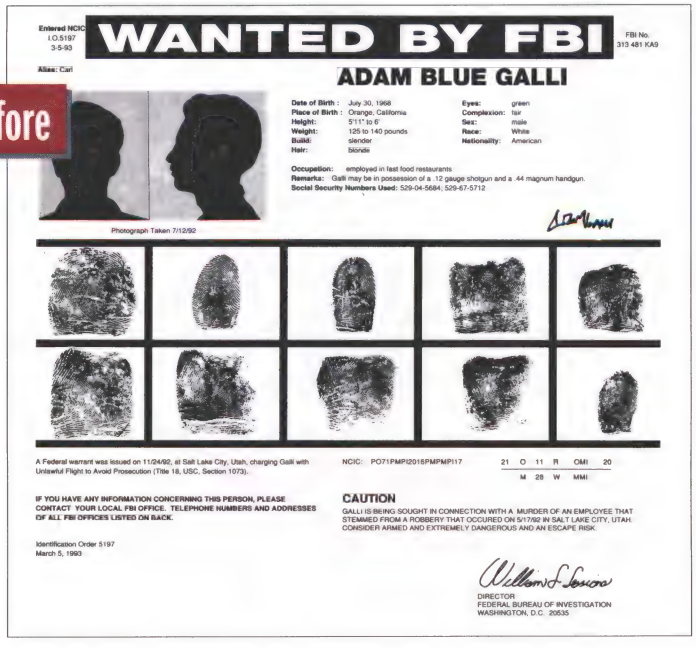
That's the problem. Imagine you're standing in line at the post office, trying to read this poster from 15 feet away. All you'd be able to see would be fingerprints. A face or a name you might know, but fingerprints?

Establish Your Priorities

Brickley's first goal, therefore, was to rearrange the poster's hierarchy of information. That means making the most important information as visually prominent as possible and reducing the size of less important details.

In this case, readers should look at Galli's face first, because that's what they're most likely to recognize. In the original design, the photograph is about the same size as each fingerprint. Brickley enlarged it to twice its original size to make it stand out better.

Brickley also wanted to make the suspect's name more prominent—even if readers haven't seen the face, they might have heard the name. In the original, the name is overshadowed by the "Wanted" line above it. Brickley moved it away from the competing headline, increased the size of the type, and set it in white type on a black background.



Deliver Your Message

So let's imagine our readers have looked at the poster from their places in line. Most decide they've never seen the face or heard the name. But suppose one of them recognizes the suspect and steps forward to get more information. What does the poster have to do next?

Its first order of business is to make sure the reader really does know this guy. That's why Brickley put the biographical details in a section beneath the photograph. Second, the reader needs to know why this guy's picture is on the wall, so Brickley ran a criminal history down the left side of the page. Finally, our reader needs to know what to do—hence the "if you have any information" paragraph at the lower left of the page.

What, you ask, happened to the fingerprints? For the post office edition of this poster, they're gone. Fingerprints may make sense in a police station, but not in a post office.

Book 'Im

Of course, the FBI's primary job is not professional design. But this is a visually competitive world, and old-fashioned designs like the FBI's posters simply don't work. With a little thought about what you're trying to accomplish with a design and how you need to accomplish it, you can make sure your printed materials don't meet the same fate.

One final note: Adam Galli is a real felon, wanted for a variety of violent crimes. If by chance you recognize the photo, contact your local FBI office or call the Washington, D.C., field office at 202/324-3000. Tell 'em *PC World* sent you.

By David Brickley and Dan Miller

The redesign was performed by David Brickley, a freelance designer based in Portland, Oregon. Dan Miller is an assistant editor for PC World. Publishing & Presentations *welcomes your document and presentation makeover candidates* *(see page 12 for contact information).*

After

1 A consistent design motif such as a headline (in this case, "Wanted by the FBI") makes it easy for readers to recognize your publication.

WANTED BY THE FBI

Wanted For:

Unlawful Flight to Avoid Prosecution - Aggravated Homicide and Aggravated Robbery.

Criminal Record:

Arrested July 9, 1992, Seattle, WA, in connection with Unlawful Flight to Avoid Prosecution.

2 Your page layout should tell readers visually what information is most important. That's why we made the picture the biggest element on the page.

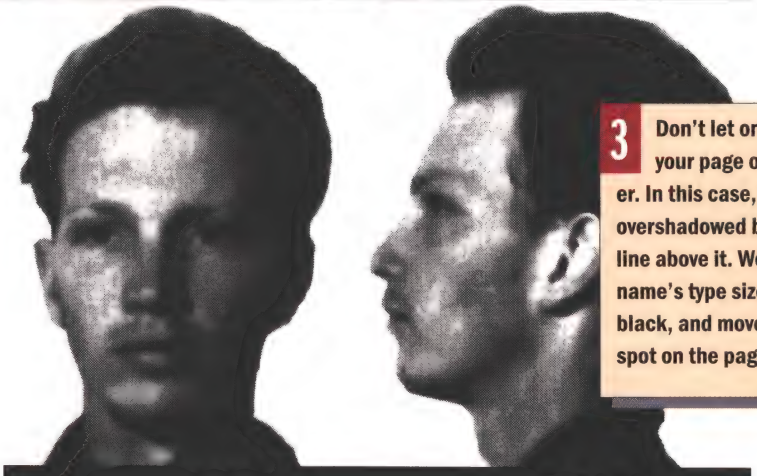
issued on the Third Circuit Utah, for Aggravated Homicide Avoid Prosecution tion 1073.

Caution:

Galli may be in possession of a .12 gauge shotgun and a 44 magnum handgun. Galli should be considered armed and dangerous.

If you have any information concerning this person, please contact your local FBI office immediately. Addresses and phone numbers of all FBI offices are listed on the back.

Director
Federal Bureau Of Investigation
Washington, D.C. 20535



3 Don't let one element on your page overwhelm another. In this case, Galli's name was overshadowed by the "Wanted" line above it. We increased the name's type size, set it white on black, and moved it to a lower spot on the page.

ADAM BLUE GALLI

Aliases: Adam Galli, Carl Galli
Photographs Taken: July 9, 1992
Suspect's age at time of photographs: 23 years old

Date of Birth:	*July 30, 1968*	*Eyes:*	*Green*	*Race:*	*White*
Place of Birth:	*Orange, California*	*Height:*	*6'0"*	*Complexion:*	*Light*
Nationality:	*American*	*Build:*	*Thin*	*Sex:*	*Male*
Occupations:	*Fast Food Worker*	*Hair:*	*Blonde*	*SSN :*	*529-67-5712*
Scars / Marks:	*None*	*Weight:*	*130-140 Lbs*	*Other SSN Used:*	*529-04-5684*

Remarks: Galli is being sought in connection with a series of armed robberies committed in and around Salt Lake City, Utah, in 1992, during one of which Galli is alleged to have fatally shot a store employee. Galli is the last of a gang dubbed "Preppie Bandits" and is known to frequent gourmet coffee houses to discuss art, philosophy, and religion. Last seen in November, 1992, when he jumped bail.

Entered NCIC	FBI No.							Ref: T
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		NCIC: PO70PMPI181SPIPOPI17						

4 Keep related information together. We collected the biographical details in a section beneath the photograph and ran the criminal history down the left side of the page.

5 What does your paper say about you? The original design's yellow paper says, "This information is stale." We switched to a bright white stock.

COMMUNICATIONS Q&A

Separating Fax and Data From Voice

In response to an answer I gave in January about using a single phone line for both voice and fax calls ("Faxes That Know Voice From Data"), Greg Wale of Fort Collins, Colorado, and Ron Neufeld of Estevan, Saskatchewan, have both written with what may be the most practical solution of all.

They suggest paying the phone company to install a second number on your existing phone line and configure it to use a distinctive ring for incoming calls. For about $100 at any office supply store, you can buy a device that plugs into the phone jack and routes the custom-ring calls to your fax-modem. Installing the second phone number on an existing line should cost you between $20 and $70, depending on where you live, plus about a $5 monthly service charge.

One warning: Many of the phone company sales reps I called about this had never heard of having two phone numbers on the same line—or of the custom-ringing option—even though their companies provided those services. So be sure the phone company rep you talk to is up to speed on the services you want.

Once you have the two numbers installed on your single phone line, plug in the routing device, which listens to the first ring before deciding whether the call goes to the fax-modem or the phone. To avoid listening to lots of rings, you may want to set your fax software to pick up the phone earlier than it normally would. If you have a home office that shares a phone line with the rest of the house, teach household members to recognize the custom ring so they won't pick up the phone when they hear it.

Returning Your E-Mail

Q I use online services to send E-mail, but I've never been able to figure out how to paste text from an E-mail message I receive into a response.
Bill Pollock, Berkeley, California

A If you're using DOS communications software, the procedure for cutting text from one E-mail message and pasting it into another depends on what software you use. In fact, many of the DOS communications programs, including Procomm Plus, won't let you do this at all. But one shareware DOS comm program that I know of, Telemate, will. Telemate is available on PC World Online (see page 12 for more information).

Cutting and pasting text between E-mail messages is easy with Windows communications software. The procedure is roughly the same for all packages. Say you're using CompuServe Information Manager for Windows. Using your mouse, simply highlight the text you wish to cut from one E-mail message and copy it to Windows' Clipboard by selecting *Edit•Copy*. To insert the text into your reply, click the spot in the reply where you want the text added, and select *Edit•Paste*.

When two numbers are installed on a single phone line, the routing device listens to the first ring before deciding where the call goes.

Downloading Stock Data

Q I'm looking for software that will pick up daily stock quotes from CompuServe, figure out what each of my stocks is currently worth, and calculate its current profit or loss. Can you offer any suggestions?
Allen M. Demby, Wyckoff, New Jersey

A You've got three choices: Andrew Tobias' Managing Your Money, Intuit's Quicken combined with Quicken Companion for Windows, or a combination of shareware and freeware communications software and a spreadsheet.

Andrew Tobias' Managing Your Money by Meca Software has a built-in utility for downloading stock quotes. MYM lists for $39.95. You can also find it bundled with a series of excellent investing books by Random House. Make sure you get version 9.0 or higher.

If you're a Quicken user, you'll want to use Quicken Companion for Windows. Among other handy skills, this software utility downloads quotes and helps track your portfolios. Quicken retails for $69.95; Companion costs $34.95 and comes with some free CompuServe time.

If you aren't currently using Managing Your Money or Quicken, you might want to use a shareware or freeware utility to handle the downloads and then import the numbers into a spreadsheet. You can find such downloading utilities for the better-known CompuServe front ends.

For example, I like to use the freeware CompuServe navigator OzCIS. Techno-investing whiz Herb Barnett has written a utility for OzCIS called QUOTE3.SCR that dials CompuServe, downloads the quotes you want, then logs off. After getting the quotes, you can use Michael Boswell's LOGPRN-.ZIP utility to convert the downloaded information to a format your spreadsheet can understand. Similar scripts are available for TapCIS and other front ends. These files can be found on PC World Online.

- **Andrew Tobias' Managing Your Money** $39.95; Meca Software; 800/820-7457
  Reader service no. 738
- **Quicken** $69.95, **Quicken Companion for Windows** $34.95; Intuit; 800/624-8742

By Judy Heim

Judy Heim is a contributing editor for PC World *and coauthor with Mike Callahan (Dr. File Finder) of* The Business Week Guide to Business Shareware *from Osborne/McGraw-Hill. Communications welcomes your questions (see page 12 for contact information).*

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Earn $100's a deal helping your clients choose, buy and finance new and used vehicles.

Using the professional version of the Intelligent Car Buyer you'll help clients:

1. Choose the exact car, color & options,
2. Arrange leasing or financing,
3. Set up a bidding war between new car dealers, guaranteeing the absolute lowest price & best warranty on the car of your client's dreams.

Without ever leaving your computer!

Turn the tables on intimidating car salesmen for your clients. Includes: Training & marketing materials, brochures, client contracts, & professional version of Intelligent New Car Buyer. **Just $299** +9.50. Call today!

2. COMPUTER STORE

4 Different New Exciting Businesses for the 90's.

Whether your client is looking for a complete system, software package, new monitor or a bigger, faster hard drive, **Intelligent Computer Buyer** will help you find it.

Intelligent Computer Buyer allows you to setup a bidding war between vendors, guaranteeing you the best price and service for your clients.

Earn hundreds of dollars without ever leaving your computer. Select the exact computer(s).

Choose brand, speed and size of memory or resolution of every component, including CPU, monitor printer and software, etc... Specify type and length of support and warranty. No inventory Needed! Includes: Training & marketing materials, brochures, client contracts, & professional version of Intelligent Computer Buyer. **Just $299** +9.50. Call today!

Fax, mail or phone in bid sheet to your choice of over 250 computer hardware & software resellers to guarantee you the best price on any hardware or software purchase. Information on resellers includes: Type of product or service, address, toll-free order# & FAX#.

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Credit Negotiations: Instant Credit provides forms that allow you to negotiate with your client's creditors:

1. A reduction in debt; 2. More favorable payment terms; 3. Full or percentage payment if negative items are removed from credit file.

Credit Management: Help clients find the best credit card values. Fill out one major credit application and Instant Credit automatically fills out over 300 bank, retail, & gas credit card applications per client. Including the leading gold and secured bank credit cards.

Each application includes: Fax#, 800#, & mailing address, allowing you to fax, mail or phone in applications.

Search the card database by: current rates, annual fees, geographic area or type of card, including gold, student, rebate, retail, gas or secured card.

Bonus: Information on how your clients can legally establish a new credit file. Includes: Training & marketing materials, brochures, client contracts, & professional version of Instant Credit. **Just $299** +9.50. Call today!

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HARDWARE Q&A

Home Alone and Powerless

Q I work at home, and every time I use my laser printer, the houselights flicker. Everything seems to work, though. Should I worry?
Celine Dyer, Coral Gables, Florida

A Laser printers draw a lot of juice when they print. You're not getting enough power from your wall socket, so the power supplies in your printer and PC will wear out sooner. (This situation can cause other problems as well.) You might try plugging your printer into a different AC circuit than the one your PC or other power-hungry devices use. If the flickering continues, you probably need a new wall socket for your printer, which means running an AC line from your circuit-breaker box. Unfortunately, this job is expensive—my local electrician charged $300.

If the flicker isn't too severe, you might want to try a line conditioner, which should cost about half as much as a new line. This device helps compensate for power sags and usually protects against potentially damaging power surges too. A more expensive device called an uninterruptible power supply (UPS) generally offers all the advantages of line conditioners, plus protection against power failures. When the lights go out, the UPS battery supplies juice for a few minutes, so you can save your work and shut down. Some of the better-known companies offering line conditioners and UPS's include American Power Conversion (800/800-4272), Best Power Technology (800/356-5794), Curtis Manufacturing (800/955-5544), and Tripp Lite (312/329-1391).

A Jumpy Mouse

Q Lately my mouse pointer has been jumping all over the place when I move the mouse slightly. I went into Windows' Control Panel and decreased the Mouse Tracking Speed, but the pointer still sometimes leaps dramatically. Is the mouse broken?
Francis Paoli, Chicago

A No, it just needs a cleaning. Flip it over, and you'll see a plastic ring with a hole in the middle and the mouse trackball nested inside. Look for a small arrow on or near the ring, probably accompanied by the word *open*. Slide the ring as indicated, and it will pop up so you can remove it and the trackball.

You'll probably find a lot of grunge in the cavity—it often collects on the rollers alongside the trackball. Dip a cotton swab in alcohol, and scrape the gunk off. When you clean the trackball, *don't* use alcohol—use adhesive tape to remove dust; if that fails, try soap and warm (not hot) water. Reassemble the creature, and I'll bet your cursor will stroll calmly across the screen.

Too Many Hard Disks

Q I want to install a third IDE hard disk in my system, but I've heard that you can't put more than two hard disks in one system. Is this true?
Rick Servatius, Phoenix

A Yes, sort of. The BIOS in a typical PC won't permit you to add a third drive. But if the system doesn't *know* you're putting in another drive, you can get away with it. So how do you keep this sort of intelligence from your BIOS? By adding a SCSI drive instead of an IDE drive. When you add a SCSI drive, standard procedure is to tell your system setup utility that *no* hard disk is present; this means, in effect, that you can install as many hard disks as your power supply can handle. (But more than three is usually pushing it.)

SCSI drives carry their own complications (see "So That's Why They Call It SCSI," *Hardware*, September 1993), but there's no rule against mixing SCSI and IDE drives. However, you'll have to buy a separate interface card for the SCSI disk, and make sure the SCSI and IDE interfaces do not conflict—which means you need to shop carefully.

First, call the manufacturer of your IDE interface card to find out how it is set up. Write down the hardware interrupt (also known as the IRQ); the I/O address; and the DMA channel, memory address, and ROM location, if any. Next, find the SCSI hard disk you want, and shop around to get a deal on a drive with a bundled interface card; this approach is generally cheaper than buying each item separately. While you're in the store, ask the vendor to let you check the *new* interface card's defaults for the five settings mentioned above. If any defaults are the same on both the IDE and SCSI cards, see if the new card allows alternate settings. If there's still a conflict, check to see if you can change the settings on your current interface. If you can't, choose another SCSI card—one that can coexist with your current hardware configuration.

I Want My PC TV

Q I'm fascinated by the idea of watching CNN on my PC monitor. Are any boards available that will allow me to use my PC as a TV?
Eric Takamiya, Davis, California

A A company called 50/50 Micro Electronics makes a PC-Television *Plus* High-Resolution card that comes complete with speakers and sells for around $330 at CompUSA. When you install it, you need to connect the device to your VGA's pass-through connector with a supplied cable. But considering you could buy a decent little color TV for $150, why turn your PC into a TV for more than twice the price?

Should SIMMs Have Parity?

Q I'm looking to upgrade my memory. When asked whether I needed parity or nonparity SIMMs, I was stumped. I looked inside my PC and found that a jumper was set to nonparity. What's the difference?
Randall Parker, San Francisco

A Your system is unusual. Most don't let you turn off parity checking, a system self-test that checks for memory errors. I recommend that you leave

parity checking on, or memory problems may go undetected and lead to data errors or system crashes—and you won't know the problem was caused by a bad SIMM. To my knowledge, the only nonparity SIMMs currently available are for old Macs; these SIMMs may work with your system, but this is a bad idea. Nonparity SIMMs are often called 8-bit (as in '1x8' for a 1MB, 8-bit SIMM), while SIMMs with parity are 9-bit ('1x9' for 1MB or '1x36' for 4MB). The extra bit is used for parity checking.

Where's That Pentium Upgrade?

Q My Gateway 2000 4DX2/66V has a socket for a Pentium OverDrive processor. Will this be as good as a real Pentium? Are more powerful processors coming out that will fit in this socket, or will I have to upgrade my motherboard?
Rick Gebhart, Battle Creek, Michigan

A The sad fact is, nobody except (or maybe *including*) Intel knows what will go in the Pentium OverDrive socket. Rumor has it that this long-overdue upgrade chip will be available by the end of 1994 or early 1995. Unlike the Pentium, with its 64-bit connection to memory, this chip will have a 32-bit connection. If other OverDrive chips are any guide, my guess is the Pentium OverDrive will increase your system's processing performance by 30 to 70 percent. After such a long delay, though, let's hope Intel feels compelled to do better than that, and at a price we can afford.

Non-Intel CPUs

Q Have you information on the new CPUs from DEC and MIPS? I want to buy a PC that won't be obsolete in a few years. What manufacturers sell these systems?
Hwa Ho, Bryan, Texas

A I've had several letters along these lines, and here's my opinion: A system with one of these processors is no hedge against obsolescence. True, such systems run Windows NT (Microsoft's high-end operating system) at an impressive clip. But unless the NT *application* you want to use has been recompiled to run with one of these chips, you'll get lackluster performance. At this point, not many apps have been recompiled, so you have a classic chicken-and-egg problem: With few applications to demonstrate the power of these systems, relatively few people are buying them—which gives software developers little incentive to recompile their applications for the new chips.

In the meantime, if you want to run DOS or Windows applications on a system with a DEC or MIPS CPU, you'll have to make it emulate an Intel processor, which will slow performance significantly. Again, because apps need to be recompiled to take advantage of these chips' power, performance will be nothing to write home about.

Assuming you want top performance and want to run DOS or Windows software now, I suggest you get a Pentium system. You can buy one fully loaded for $3000 or so, and it won't run out of gas anytime soon.

By Eric Knorr

Eric Knorr is a contributing editor for PC World. Hardware *welcomes your questions* *(see page 12 for contact information).* ■

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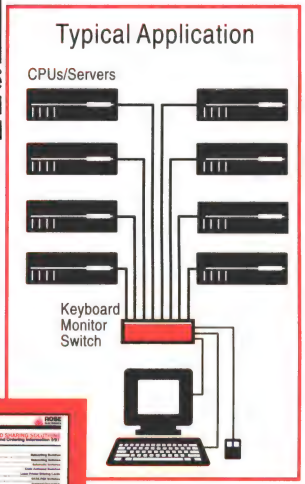

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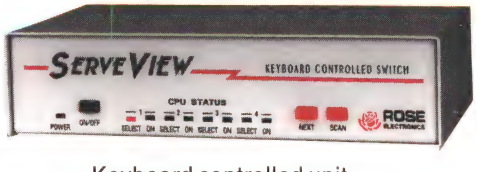

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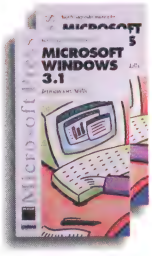

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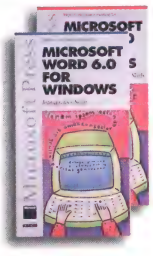

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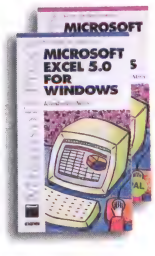

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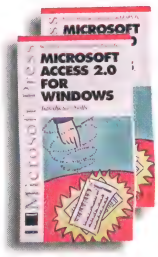

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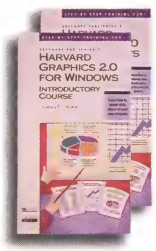

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WordPerfect Outline Power

I've created a macro for WordPerfect 5.1 that enables you to number paragraphs and assign corresponding outline levels to them with just two keystrokes. I've assigned this macro **[FIGURE 1]** to the keystroke <Alt>-P.

To use the macro, position the cursor at the beginning of the paragraph, press **<Alt>-P** to activate the macro, and enter a digit from 1 to 8 to set the level of the paragraph. The macro separates the paragraph number from the following text by adding two spaces between them.

When the macro is invoked, any keystroke other than a digit from 1 to 8 will cause a beep and produce an error message on the status line. Pressing the <Space> bar instead of a digit will abort the macro.

Ralph D. Jones, U.S. Armed Forces

Editor's note: This macro automates and bulletproofs the process of adding paragraph numbers to a WordPerfect 5.1 document. You can locate the macro on PC World Online as ALTP.WPM or create it yourself in WordPerfect.

To create ALTP-.WPM, you need to use WordPerfect's macro editor, which you activate by pressing **<Ctrl>-<F10>**. With the macro editor, you insert different types of commands in different ways. To insert a command that's shown in Figure 1 in **boldface,** press **<Ctrl>-<Page Up>**, select the command from the pop-up list in the upper right corner of the screen, and press **<Enter>**. If a command in the figure is underlined, press the appropriate key (for example, **<Shift>-<F5>** for {Date/Outline}). For commands that are shown **boldface and underlined**, press **<Ctrl>-V**, followed by the appropriate key (for example, **<Ctrl>-V**, and then **<Enter>** for **{Enter}**). Type plainly printed text as it appears.

```
{;}ALTP.WPM - Enter paragraph numbers~
{LABEL}ask4lvl~

{;}Initialize variable~
{ASSIGN}paranum~~

{;}Get level into variable~
{CHAR}paranum~Press 1-8 for the level,
   space bar to quit, Enter for auto level.~

{;}End if space bar is pressed~
{IF}"{VARIABLE}paranum~"=" "~
  {GO}nopara~
{END IF}

{;}Auto level if Enter is pressed~
{IF}"{VARIABLE}paranum~"={Enter}"~
  {Date/Outline}P{Enter}
  {GO}endpara~
{END IF}

{;}Beep and ask again if input not correct~
{IF}"{VARIABLE}paranum~"<"1"|"{VARIABLE}paranum~">"8"~
  {STATUS PROMPT}INVALID INPUT. TRY AGAIN.~
  {BELL}{WAIT}3~{BELL}{WAIT}2~{WAIT}12~
  {GO}ask4lvl~
{END IF}

{;}Create paragraph number using digit~
{Date/Outline}P{VARIABLE}paranum~{Enter}
{GO}endpara~

{;}Add two spaces after number, end macro~
{LABEL}endpara~
<Space><Space>
{LABEL}nopara~
{STATUS PROMPT}~
```

FIGURE 1: NUMBER WORDPERFECT PARAGRAPHS AUTOMATICALLY using ALTP.WPM. (Press the <Space> bar twice to enter the line containing <Space><Space>.)

Drag and Drop DOS Data

If you're in the habit of using Windows' File Manager and want to open a data file in a DOS program that has a PIF file, just drag the file and drop it on top of the PIF file. This technique doesn't move the document; instead, it executes the DOS program and opens the data file. To test it, drop the NIBBLES.BAS file (in your DOS directory) onto QBASIC.PIF—which appears in your Windows directory if you use the Windows Setup program to install QBASIC—and watch the results.

Francisco J. Bermejo, Calexico, California

Editor's note: This tip isn't limited to PIF files; you get the same result, for example, if you drop NIBBLES.BAS onto QBASIC.EXE. The advantage to using a PIF file (if one exists) is, it sets up a DOS session customized to run that DOS program. In either case, File Manager provides the name of the file you've dragged and dropped as a command line parameter to the program it's dropped onto—saving you the trouble of typing the path and file name.

OS/2 for Windows

Microsoft has just released a free upgrade to Windows that updates the set of included drivers and fixes a few obscure bugs. Unfortunately, the new version, Windows 3.11, doesn't run under OS/2 for Windows, which uses the existing Windows software to run Windows applications under OS/2.

You can make Windows 3.11 run under OS/2, however. The secret is, don't install quite all of it—keep your old version of KRNL386.EXE. If you install the rest of the upgrade as directed, it will identify itself as Windows 3.11 when it runs.

Michael A. Covington, Athens, Georgia

Editor's note: It's unclear whether the incompatibilities between Windows

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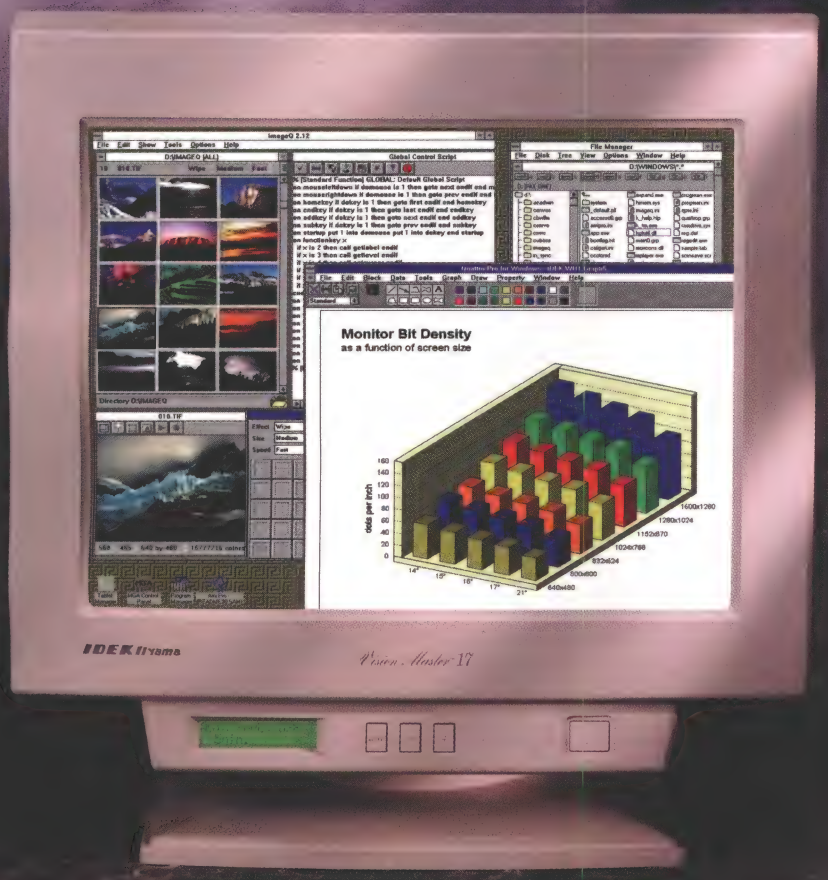

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Circle 229 on reader service card

3.11 and OS/2 for Windows are intentional or accidental, but Mr. Covington's workaround seems the best solution, at least until IBM updates OS/2 for Windows. As an OS/2 user who wants to take advantage of the newer Windows 3.11 code (which fixes some of the many bugs in Windows 3.1), I plan to use Mr. Covington's solution myself for the time being. Without this fix, I'd be forced to reboot to DOS to run Windows programs and forfeit the program isolation and crash protection afforded by OS/2's virtual machines.

Do you lose any of the advantages of Windows 3.11 by using 3.1's KRNL386-.EXE file? You may lose a few minor bug fixes, but nothing substantial. The main advantages of Windows 3.11 are the improved drivers, which don't care what version of KRNL386.EXE you're using.

An IBM source reports that you may also need to keep the Windows 3.1 version of USER.EXE (which also won't affect the drivers), although both Mr. Covington and I were able to run Windows 3.11 under OS/2 for Windows simply by preserving the older version's KRNL386.EXE file. To save the older files, copy them to another directory or rename them before installing Windows 3.11. Copy the old files over the new ones (Windows 3.11 files bear a 1994 date; Windows 3.1 files are dated 1992). As we went to press, Microsoft announced it would provide OS/2 for Windows users with a patch disk that copies the necessary Windows 3.1 files over a Windows 3.11 installation.

Time-Out Windows' Screen Saver

Imagine this: your Windows application is taking a long time to perform a complex database query or computation. Instead of sitting around waiting for your computer to finish, you decide to get a cup of coffee. When you come back half an hour later, you find that a Windows screen saver is running. You move the mouse a little to turn it off, and you discover that the job never completed, because the screen saver has been soaking up valuable CPU power.

To avoid this problem, you could simply turn off the screen saver before each unattended CPU-intensive operation, or you could stop using a screen saver altogether. But if you want to disable the screen saver during just one operation, here's a better way: Simply select a menu (such as File or Edit) in any Windows program, and leave it displayed. That's it! A Windows screen saver will not activate as long as one of the menus is visible.

Bruce Poon, Windsor, Ontario, Canada

Editor's note: This technique works great with the screen savers that come with Windows. But if you have After Dark or another screen saver by Berkeley Systems, keeping a menu down won't do the trick. If you use After Dark or the Star Trek, Disney, or Marvel Posters screen saver, move your mouse cursor to the no-sleep corner of the screen (by default, the lower right). The cursor will change shape to look like a white control button, and the screen saver won't turn on. Other third-party screen savers probably have similar features.

If you expect to be away from your computer for a long time, however, it's a good idea to turn off your monitor when using these techniques. Besides saving power, you'll ensure that an image isn't burned in to your screen. True, many experts say that burn-in isn't a problem with today's monitors, but since this opinion isn't universal, why take the risk?

Finding Files in FoxPro

Here's how to make sure that a FoxPro program always finds the database files it needs. Let's say you've developed an application called GARB_IN, which resides in its own home directory (also called GARB_IN) and accesses databases or reports in subdirectories called DBFS or REPORTS beneath that directory. For convenience, you'll probably want to allow the user to invoke the program without changing the current directory to the one where the program was installed.

Now, let's suppose your program opens the file MASTER.DBF, which lies in your program's DBFS subdirectory. The usual FoxPro commands to do this are as follows:

```
file=FULLPATH("DBFS\MASTER.DBF",1)
USE (file)
```

FoxPro's FULLPATH function tracks down the DBFS subdirectory that contains the MASTER.DBF file by searching the directories specified in your system's PATH variable. Unfortunately, if GARB_IN users have another application on the disk (such as GARB_OUT or an earlier version of GARB_IN) that uses the same convention for naming subdirectories, it's possible that

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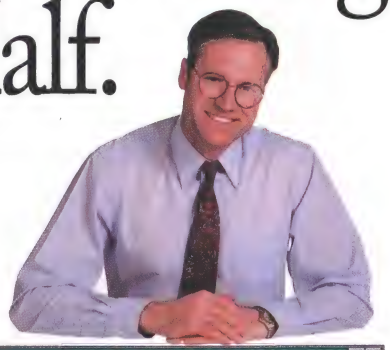

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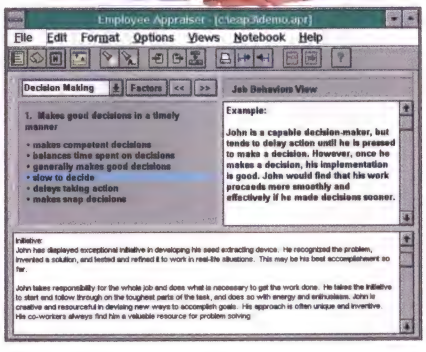

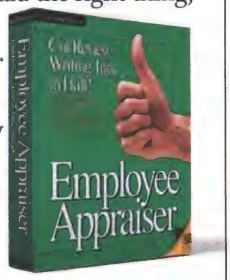

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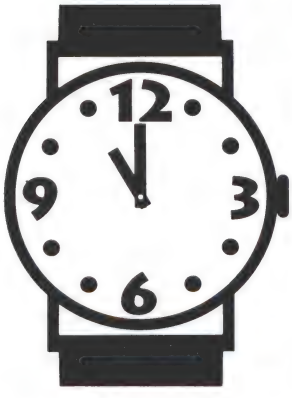

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STAR-DOT-STAR TIPS

FoxPro will find the other program's MASTER.DBF file and open it instead.

You can solve this problem by inserting the following commands in your program:

```
prog=SYS(16,1)
startdir=SUBSTR(prog,1,RAT("\",prog))
```

After these commands execute, the variable 'startdir' will contain the full path from which your program was run. You can then append the subdirectory's name and the name of the database or report you wish to open, creating a complete path for the desired file. For example, to open the file MASTER.DBF in the subdirectory DBFS (which in turn lies beneath the program's main directory), you'd execute the command **USE startdir+"DBFS\MASTER.DBF"**.

Yogesh Muzumdar, Bombay, India

Editor's note: Almost every programming language has some way to tell you which directory the current program was launched from. (Turbo Pascal, for instance, retrieves this information when you call the ParamStr() function with a parameter of 0.) However, many programmers forget to use this information. At best, its omission leads to misplaced files—especially in Windows, where the default directory for storing data files often becomes your main Windows directory. And in a mission-critical FoxPro database program, the consequences of opening the wrong file can be devastating.

I recommend Mr. Muzumdar's technique to all FoxPro programmers—as well as to programmers who work in other languages.

By Brett Glass

Brett Glass is a contributing editor for PC World. Star-Dot-Star *welcomes your tips, macros, batch files, and short programs (see page 12 for contact information).*

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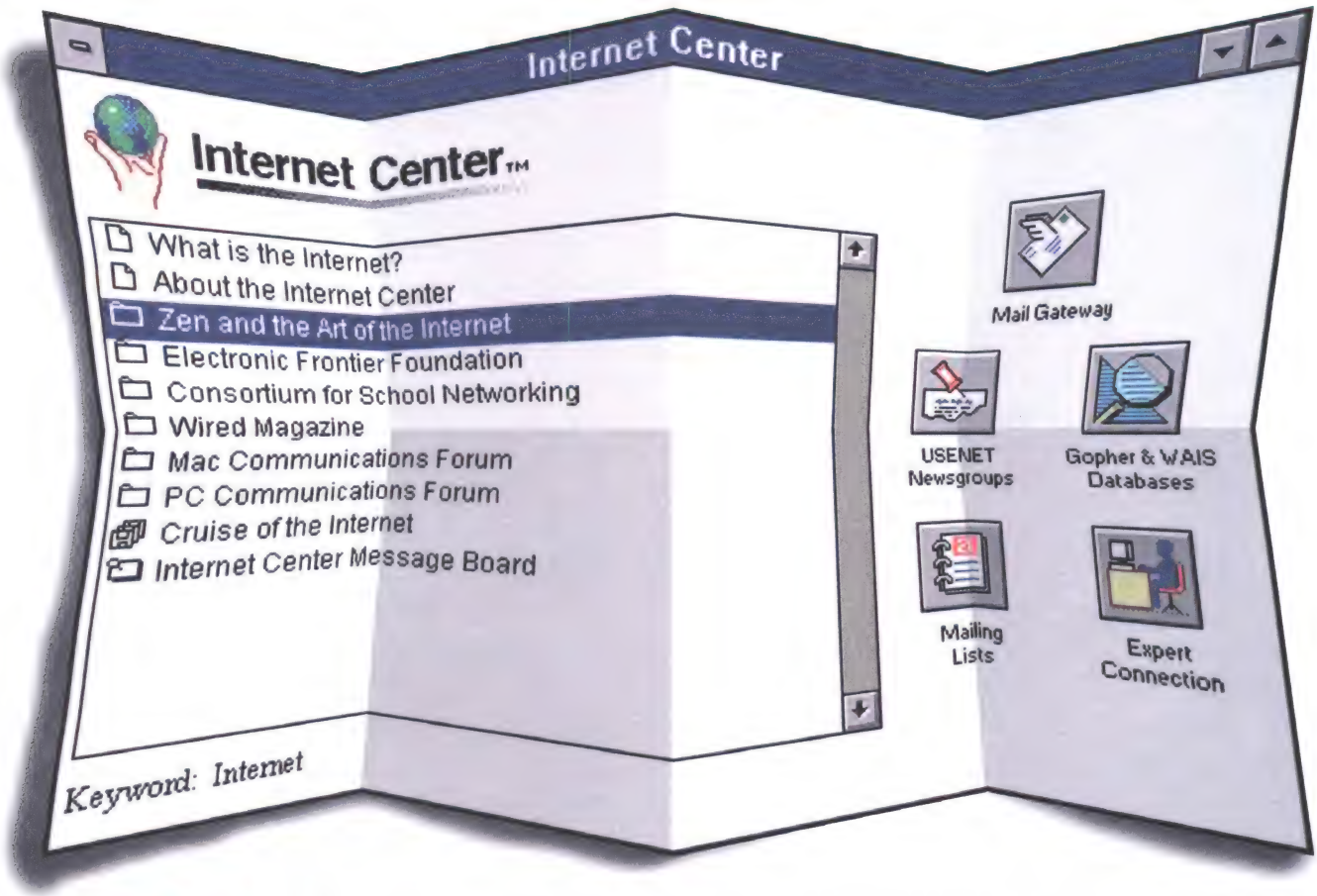

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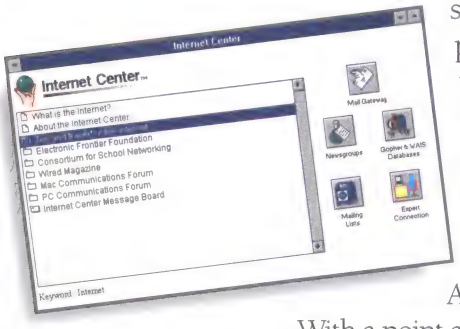

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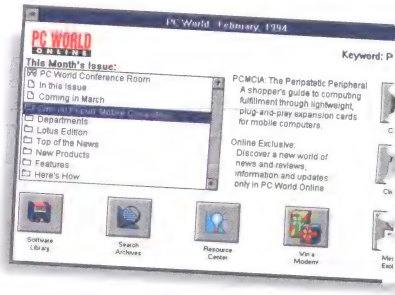

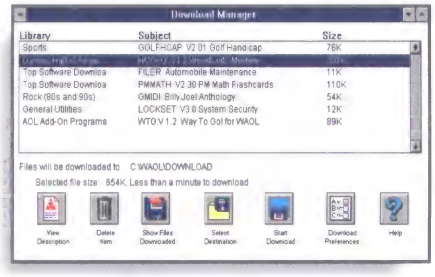

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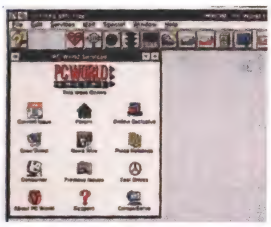

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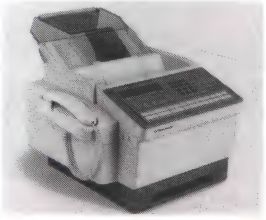

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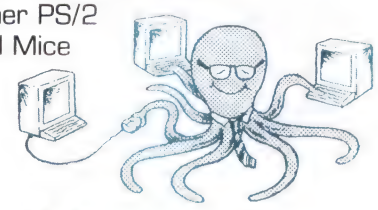

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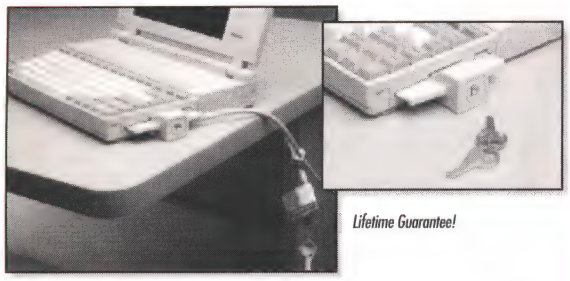

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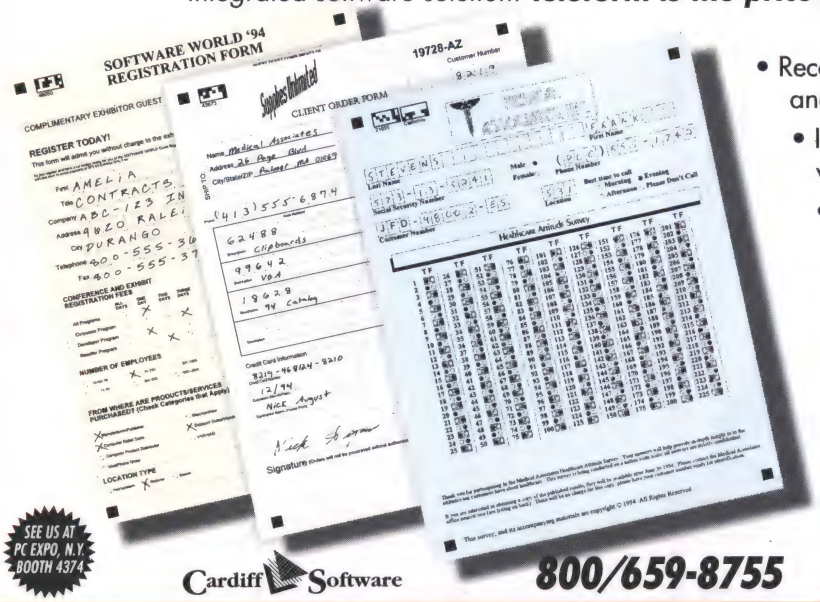

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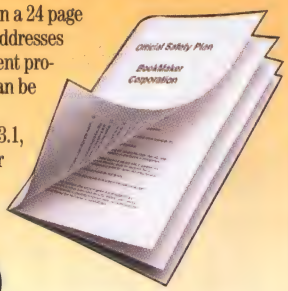

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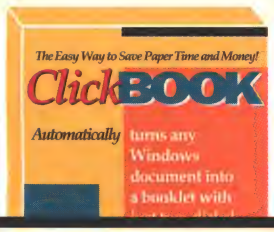

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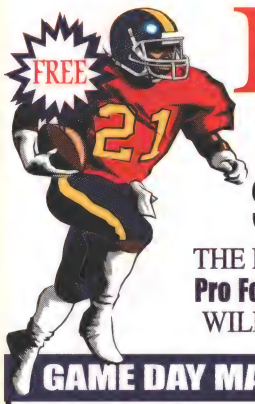

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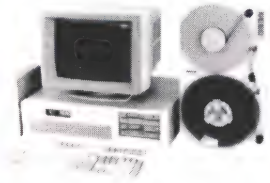

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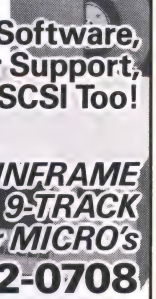

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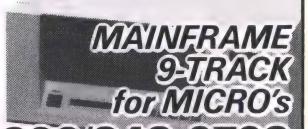

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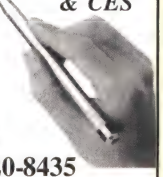

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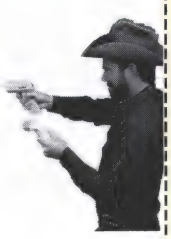

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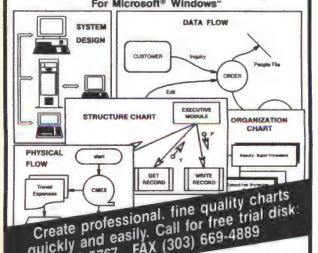

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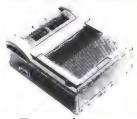

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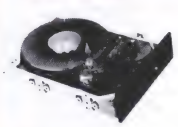

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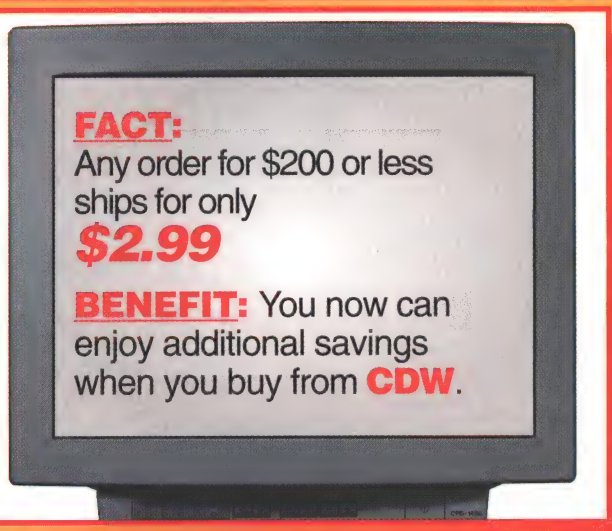

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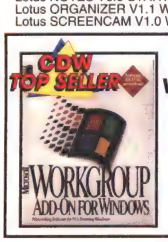

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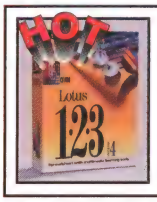

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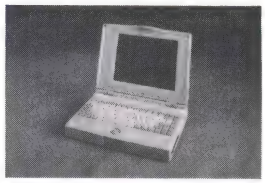

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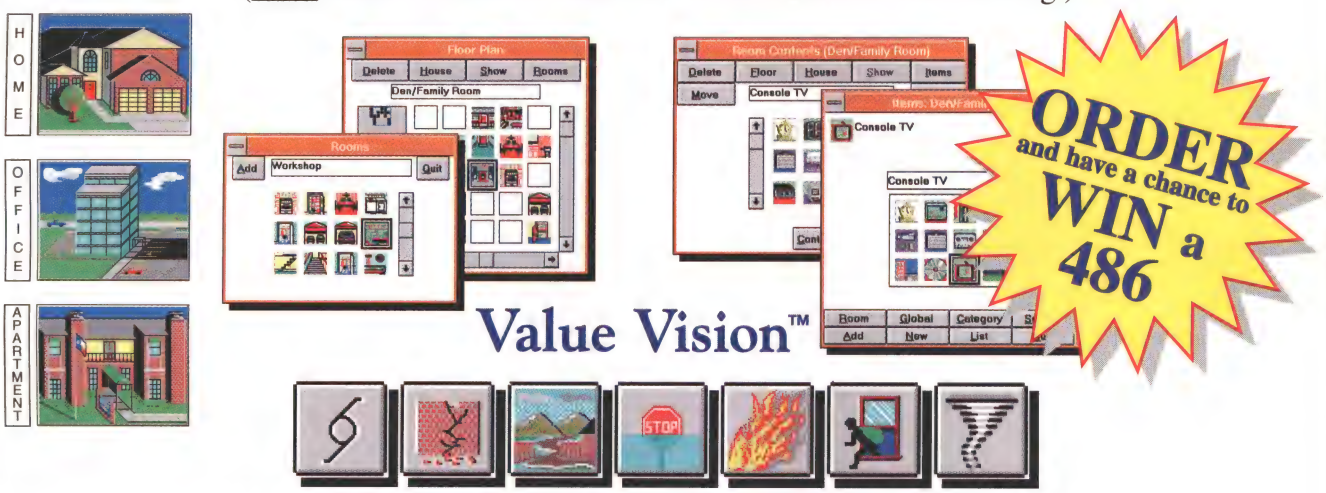

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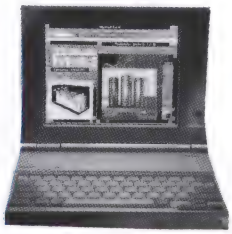

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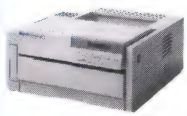

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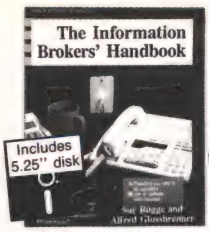

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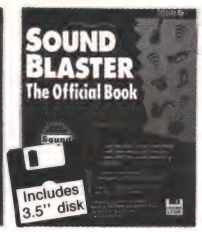

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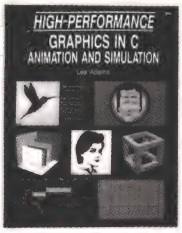

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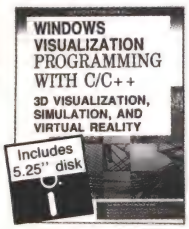

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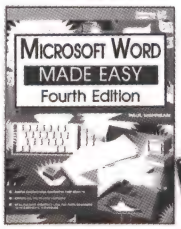

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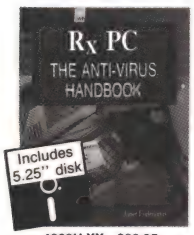

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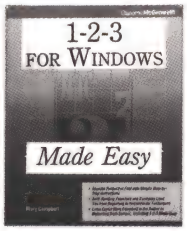

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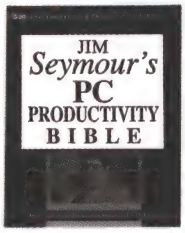

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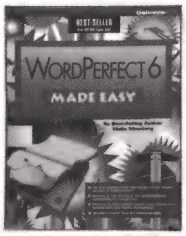

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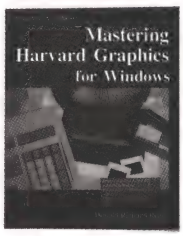

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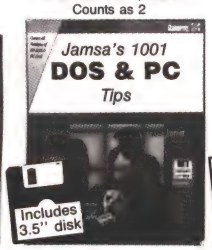

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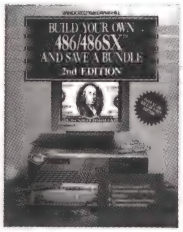

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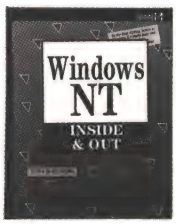

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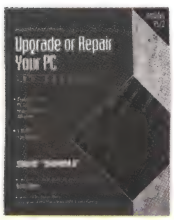

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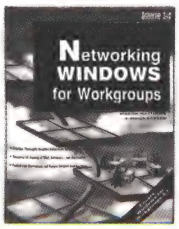

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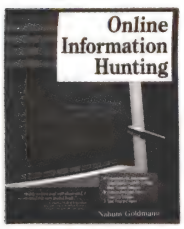

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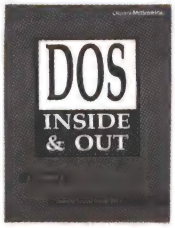

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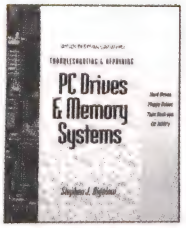

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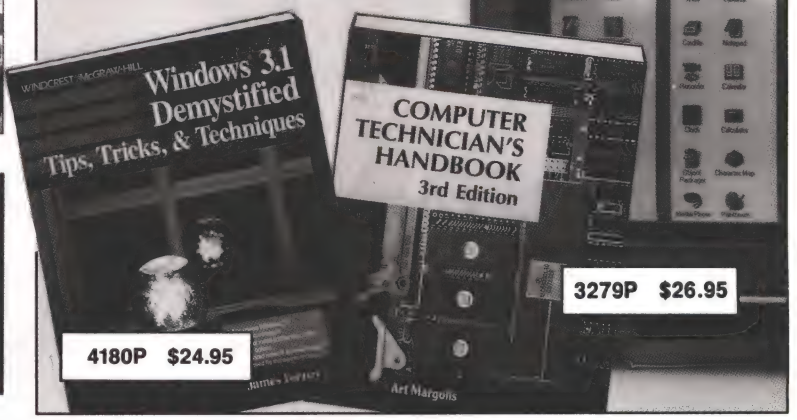

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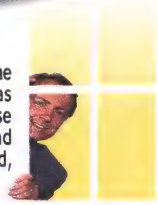

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DeskPro 386/33, 386/33L, 486/25, 486/33L, 486/50L, System Pro	2Meg Module	115144-001	139.00
	8Meg Module	116561-001	429.00
	32Meg Module	116568-001	1459.00
DeskPro 386/33L, 486/33L	(Exp Bd)	116569-001	279.00
DeskPro 386/25, 386/20	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	199.00
DeskPro 386S-16MHz	1Meg Exp Bd	113633-001	149.00
	4Meg Exp Bd	113634-001	279.00
	1Meg Module	113646-001	79.00
	4Meg Module	112534-001	199.00
DeskPro 386/20E	1Meg Exp Bd	113644-001	149.00
DeskPro 386/25E	4Meg Exp Bd	113645-001	279.00
	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	219.00
DeskPro 286N, 386N, 386SX/20, 386/25M, 486/33M, 486S/25M, 486S/16M	1Meg Module	118688-001	59.00
	2Meg Module	118689-001	89.00
	4Meg Module	118690-001	169.00
Port. I Series 486C	8Meg Module	128877-001	389.00
M Series Exp Bd	0-64Meg	129160-001	189.00
DeskPro 386/16	1Meg Kit	108071-001	99.00
	4Meg Kit	108079-001	299.00
	1-2Meg Exp Bd	108069-001	239.00
	4-8Meg Exp Bd	108070-001	437.00
DeskPro 286	512K Kit	113012-001	49.00
DeskPro 5/60, 5/66M, 5/66M (ALL OF THESE MACHINES USE THESE MODULES)	8Meg Kit	149911-001	389.00
Prosignia 5/60	16Meg Kit	149949-001	707.00
Proliant 100 5/60	32Meg Kit	149912-001	1399.00
Proliant 2000 4/30, 5/66	64Meg Kit	149913-001	2700.00
Proliant 4000 4/50, 5/66	128Meg Kit	149914-001	5900.00
Prolinea 386 3/25S, 3/25ZS	2Meg	141738-001	109.00
	8Meg	141742-001	338.00
Prolinea 486 4/25S, 4/33, 4/50, 4/66, CDS	2Meg	141683-001	95.00
Prosario series	4Meg	141684-001	175.00
	8Meg	141685-001	339.00
Prosignia PC Server, 486/33, 486 DSX/66	8Meg	141685-001	339.00
	16Meg	149320-001	699.00
	32Meg	149147-001	1525.00

COMPAQ LAPTOPS & NOTEBOOKS

LTE/286	2Meg Bd	117081-002	99.00
LTE/286	4Meg Bd	117081-003	179.00
LTE/386S/20	4Meg Module	121125-002	209.00
LTE LITE/20, 25, 25C	4Meg Module	129769-002	209.00
LTE LITE/20, 25, 25C	8Meg Module	129769-003	419.00
LTE LITE/20, 25, 25C	16Meg Module	129769-004	809.00
LTE LITE 4/25C, 4/23E, 433C	4Meg Module	142337-002	179.00
LTE LITE 4/25C, 4/23E, 433C	8Meg Module	142337-003	349.00
LTE LITE 4/25C, 4/23E, 433C	16Meg Module	142337-004	774.00
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Contura 320, 325	2Meg	139497-001	99.00
	4Meg	139498-001	179.00
	8Meg	139499-001	349.00
Contura 4/25, 4/25C, 4/25CX	4Meg	146520-001	179.00
	8Meg	146521-001	339.00
	16Meg	146531-001	759.00
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	8Meg	190597-001	433.00

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T2000/T2000SX	2Meg	PC18-PA8317U	94.00
T2000SX/T1000LE	4Meg	PC-PA8314U	189.00
T2000SX/T1000LE	8Meg	PC14-PA8315U	359.00
T2000SXE/2200SX/T1800, 1850, C	2Meg	PC-PA2000U	94.00
T2000SXE/2200SX/T1800, 1850, C	4Meg	PC-PA2001U	189.00
T2000SXE/2200SX/T1800, 1850, C	8Meg	PC-PA2002U	359.00
T4400SX, SXC T6400, T6600	4Meg	PC-PA2004U	199.00
T4400SX, SXC T6400, T6600	8Meg	PC-PA2005U	379.00
T4400SX, SXC T6400, T6600	16Meg	PC-PA2010U	699.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	4Meg	PC-PA2012U	209.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	8Meg	PC-PA2013U	409.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	16Meg	PC-PA2014U	839.00
T3300SL	6Meg	PC-PA2008U	268.00
T3300SL	16Meg	PC-PA2009U	599.00
T3400CT	4Meg	PC-PA2019V	199.00
	8Meg	PC-PA2020V	399.00
	16Meg	PC-PA2021V	819.00
	32Meg		1599.00
T1200XE	2Meg	PC13-PA8306	99.00
T1600	2Meg	PC8-PA8302U	99.00
T3100	2Meg	PC3-PA7135E	139.00
T3100e	2Meg	PC9-PA8340U	109.00
T3100SX	2Meg	PC15-PA8308U	109.00
T3100SX	4Meg	PC15-PA8310U	199.00
T3200	3Meg	PC6-PA7137U	185.00
T3200SX	2Meg	PC12-PA8307U	119.00
T3200SX	4Meg	PC12-PA8909	199.00
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T3200SXC	4Meg	PC19-PA8319U	199.00
T5100	2Meg	PC7-PA8301U	95.00
T5200/T8500	2Meg	PC10-PA8304U	114.00
T5200/T8500	8Meg	PC10-PA8313U	419.00

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MODEL	AMT. UPGRADED	MANU. PART #	PRICE
ACER 730	2Meg/4Meg/8Meg		109/209/449
ACER 750	4Meg/8Meg/16Meg		199/459/869
ALR Venture	4Meg	12407980	249.00
AST Bravo & Explorer	4Meg/16Meg	501255-001, -002	199.00/789.00
AST Notebook Prem Exec 386SX/20/25/25L	4Meg	500814-003	189.00
AST Power Exec 3/25C, 425EL	4Meg		199.00
AST Power Exec 3/25C, 425EL	16Meg		819.00
AST Power Exec 425SL	4Meg	501166-001	199.00
AST Power Exec 425SL	16Meg	501166-003	819.00
AST Power Exec 4/33SL	4Meg/16Meg	501318-001,002	194.00/769.00
AT&T Safari NSX/20	4Meg	PEC 37651	259.00
Bondwell B310, Plus	1Meg	23050-09100	109.00
Bondwell B310V, SX	1Meg		109.00
Bondwell B310V, SX	4Meg		229.00
Canon Innova 486	2Meg/4Meg/8Meg		109/209/449
Canon Notejet 486	4Meg/ 8 Meg		219.00/419.00
Chicony, Ultra, Hyundai 386	4Meg		199.00
Epson NB3	4Meg	A808511	199.00
Everex Tempo LX, LX20, Carrier	2Meg	PCA 00053-0001	109.00
Gateway 2000 Nomad 425 DXL/SXL	4Meg/16Meg		199.00/1549.00
Gateway 2000 486 Handbook	4Meg/16Meg		199.00/799.00
Goldstar GS520 386SX/16	4Meg	S386-4M	249.00
Grid 1720, 1750, 1755	1Meg		49.00
Magnavox Metalis	1Meg/4Meg	286, 386SX	109.00/199.00
NEC Prospeed 286, 386SX-16	1Meg	PC21-21	79.00
NEC Prospeed 286, 386SX-16	4Meg	PC21-22	199.00
NEC Prospeed 386	2Meg	PC31-21	119.00
NEC Prospeed 386	8Meg	PC31-22	399.00
NEC Prospeed 386SX-20	1Meg	PC43-21	79.00
NEC Prospeed 386SX-20	4Meg	PC43-22	199.00
NEC Ultralite Versa	4 Meg/8Meg/16Meg/20Meg	OP4104	183/359/799/988
Packard Bell 386SX, 286	1Meg, 4Meg	286, 386SX	109/199
Panasonic CF170, CF270, CF370	1Meg	CF-BA165	49.00
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Sanyo 17/18 NB	2Meg	MBC-NBMEM2	109.00
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Tandy 1510, 2810, 3810	1Meg		49.00
Tandy 2820, 3820, 3830	2Meg/4Meg/6 Meg		119/199/309
Twinhead, Atlima, Compodyne, 486SX, DX, Tandy 4860	4Meg/16Meg		199.00/859.00
Ultra 486	2Meg, 4Meg, 6Meg		CALL
Zeos 386SX Notebook (not the + version)	2Meg		109.00
Zenith Master Sport 386SX	2Meg	ZA-300-1	114.00
Zenith Master Sport SL, SLE	2Meg	ZA-4-4	119.00
Zenith Super Sport 286, 286E	1Meg	ZA-180-66	99.00
286E SX	2Meg	ZA-180-64	149.00
SX Alpha	2Meg	ZA-180-86	149.00
SX Beta	2Meg	ZA-180-87	149.00
Zenith Z-Note 325L, LC	2Meg/8Meg	ZA3250-4/5	129.00/419.00
Zenith Z-Note 425LN, LNC, LNP	4/8/16Meg		269/519/839

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Epson 6000, Action Laser	–	–	–	139	–	–	229	–	–	–	–	–
Epson Action Laser II	–	–	89	–	228	–	–	367	–	–	–	–
Epson 8000	–	–	89	–	228	–	–	367	–	–	–	–
Epson 1000, 1500	–	–	***– 129***	–	–	–	***258***	–	***Call***	*IN STOCK		
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HP 3, 3D, 3P, 2P 2P+	–	–	–	149	–	–	169	–	–	–	–	–
HP 4, 4M, 4SI, 4SIMX, 4P, 4MP	–	–	–	89	–	–	169	–	–	349	–	–
HP 4L	–	–	59	–	–	–	–	–	–	–	–	–
HP 3SI	–	–	69	–	–	–	169	–	–	349	–	–
HP 4SI	–	–	–	69	–	–	169	–	–	349	–	–
HP Design Jet 600, 650	–	–	–	–	–	–	169	–	–	349	–	–
HP Deskjet 500, 500C, 510, 550	–	55	–	–	–	–	–	–	–	–	–	–
HP Deskjet 1200C, 1200C/P	–	–	–	89	–	–	169	–	–	349	–	–
HP Paintjet XL300	109	–	–	–	–	–	289	–	–	469	837	–
IBM Laser 4019, 4019E	–	–	–	–	169	–	–	–	–	–	–	–
IBM Laser 4029	–	–	–	–	–	–	169	–	–	–	–	–
IBM Laser 4039, 4079	–	–	–	99	–	–	169	–	–	350	–	–
NEC 90, 290	–	–	–	139	–	–	–	–	–	–	–	–
NEC 95, 97	–	–	–	99	–	–	–	–	–	–	–	–
Oki 400	–	–	–	89	–	–	–	–	–	–	–	–
Oki 400 E	–	135	189	–	–	–	–	–	–	–	–	–
Oki 830, 840	–	–	–	109	–	–	–	–	–	–	–	–
Packard Bell PB 9500	–	–	–	139	–	–	227	–	–	–	–	–
Packard Bell 9815	–	–	–	180	–	–	299	–	–	–	–	–
Panasonic 4420/4450I	–	–	–	129	–	–	209	–	–	–	–	–
Panasonic 4410/4430	–	–	–	126	–	–	195	–	–	–	–	–
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Panasonic 4440, 5410	–	–	Call	Call	–	–	Call	–	–	–	–	–
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452MB ST3550A	12MS 3.5X1"	334
540MB ST3655A	12MS 3.5"	413
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540MB ST3600N SCSI-2	11MS 3.5X1"	490
343MB ST3390N SCSI-2	12MS 3.5X1"	339
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540MB CP30544	10MS 3.5X1"	435
SCSI		
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340NB CFA340S	13MS 3.5X1"	305
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4MB X 9-60NS SIMM	175	256K X 9-70NS SIMM	15	256K X 9-100NS SIPP	18
1MB X 9-100NS 9 CHIP SIMM	40	256K X 9-60NS SIMM	18	256K X 9-80NS SIPP	19
1MB X 9-80NS 3 CHIP SIMM	40	1MB X 8-80NS SIMM	42	256K X 9-70NS SIPP	20
1MB X 9-80NS 9 CHIP SIMM	46	1MB X 8-70NS SIMM	45	256K X 9-60NS SIPP	23
1MB X 9-70NS 3 CHIP SIMM	42	4MB X 8-80NS SIMM	150	256 X 36 – 1MB	50
1MB X 9-70NS 9 CHIP SIMM	48	4MB X 8-70NS SIMM	165	512 X 36 – 2MB	85
1MB X 9-60NS 3 CHIP SIMM	44	1MB X 9-100NS SIPP	45	1 X 36 – 4MB	175
1MB X 9-60NS 9 CHIP SIMM	50	1MB X 9-80NS SIPP	51	2 X 36 – 8MB	375
1MB X 9-53NS 9 CHIP SIMM	55			4 X 36 – 16MB	695
16MB X 9-70NS SIMM	775				

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386DX-40-64K CACHE W/CPU	CALL
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486SX-25-64K CACHE W/CPU	CALL
486DX-33-64K CACHE W/CPU	CALL
486DX-33-256K CACHE W/CPU	CALL
486DX-50-256K CACHE W/CPU	CALL
OCEAN	
JAGUAR 386DX-40 6-ISA, 8-30P	CALL
486SX-25 6-ISA, 33VLB DCA CACHE 8-30	CALL
486SX-33 6-ISA, 3VLB, DCA CACHE, 8-30P	CALL
486DX-40 6-ISA, 3VLB, DCA CACHE, 8-33P	CALL
486DX2-66 6-ISA, 3VLB, DCA CACHE, 8-30P	CALL
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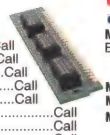

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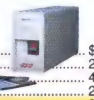

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HARD DRIVES

From the Mass Storage Experts.

Capacity	Interface	Model	Access	FF/Height	Bare	Kit
WESTERN DIGITAL						
170MB	IDE	WDAL217Ø	12ms	2.5"	$319	319
200MB	IDE	WDAL22ØØ	12ms	2.5"	339	359
210MB	IDE	WD121ØA	12ms	3.5" 1"H	209	229
270MB	IDE	WD127ØA	12ms	3.5" 1"H	229	249
250MB	IDE	WD225ØA	12ms	3.5" 1"H	219	239
340MB	IDE	WD234ØA	12ms	3.5" 1"H	259	289
420MB	IDE	WD242ØA	12ms	3.5" 1"H	279	309
540MB	IDE	WD254ØA	12ms	3.5" 1"H	389	409
730MB	IDE	WD27ØØA	12ms	3.5" 1"H	549	569
1080MB	IDE	WD31ØØØA	10ms	3.5" 1"H	749	769
CONNER						
213MB	IDE	CFS21ØA	14ms	3.5" 1"H	$219	$239
340MB	IDE	CFA34ØA	13ms	3.5" 1"H	309	329
340MB	SCSI	CFA34ØS	13ms	3.5" 1"H	349	449
426MB	IDE	CFS42ØA	14ms	3.5" 1"H	359	379
540MB	SCSI	CFA54ØS	10ms	3.5" 1"H	679	779
1060MB	SCSI	CFP1Ø6ØS	9.5ms	3.5" 1"H	899	999
FUJITSU						
510MB	IDE	FJ2624A	12ms	3.5" HH	$499	$519
520MB	SCSI	FJ2624S	12ms	3.5" HH	489	589
1080MB	SCSI	FJ2694S	10ms	3.5" HH	799	899
Maxtor						
130MB	IDE	MX7131A	15ms	3.5" 1"H	$189	$209
250MB	IDE	MX7245A	15ms	3.5" 1"H	239	259
250MB	SCSI	MX7245S	15ms	3.5" 1"H	249	349
340MB	IDE	MX7345A	12ms	3.5" HH	289	309
340MB	SCSI	MX7345S	12ms	3.5" HH	349	449
MICROPOLIS						
976MB	IDE	MC2210A	10ms	3.5" HH	$779	$799
1050MB	SCSI	MC4110S	8.5ms	3.5" HH	799	899
1050MB	SCSI	MC2210AV	10ms	3.5" HH	899	999
1626MB	IDE	MC2217A	10ms	3.5" HH	1,089	1,109
1690MB	SCSI	MC2217AV	10ms	3.5" HH	1,199	1,299
1750MB	SCSI	MC2217S	10ms	3.5" HH	1,079	1,179
2100MB	SCSI	MC1926	11ms	5.25" FH	1,399	1,499
3000MB	SCSI	MC1936	11ms	5.25" FH	2,069	2,169
3000MB	SCSI	MC1936AV	10ms	5.25" FH	2,049	2,149
Seagate						
130MB	IDE	ST3145A	15ms	3.5" 1"H	$189	$209
210MB	IDE	ST3243A	14ms	3.5" 1"H	209	229
260MB	IDE	ST329ØA	16ms	3.5" 1"H	219	239
340MB	SCSI	ST339ØN	11ms	5.25" FH	379	479
452MB	IDE	ST355ØA	12ms	3.5" 1"H	339	359
452MB	SCSI	ST355ØN	12ms	3.5" 1"H	529	629
528MB	IDE	ST3655A	12ms	3.5" 1"H	389	409
540MB	SCSI	ST3655N	12ms	3.5" 1"H	589	689
1050MB	SCSI	ST312ØØN	9.5ms	3.5" 1"H	769	869
1700MB	SCSI	ST11950N	8ms	3.5" 1"H	1,499	1,599
1700MB	SCSI	ST119ØØN	9ms	3.5" HH	1,099	1,199
2100MB	SCSI	ST124ØØN	10.5ms	3.5" HH	1,449	1,549
2145MB	SCSI	ST1255ØN	8ms	3.5" HH	1,699	1,799
2900MB	SCSI	ST434ØØN	11ms	5.25" FH	2,049	2,149
9080MB	SCSI	ST41Ø8ØØN	11ms	5.25" FH	3,995	4,095
Quantum						
170MB	IDE	QULPS17ØA	14ms	3.5" 1"H	$199	$209
170MB	SCSI	QULPS17ØS	14ms	3.5" 1"H	199	299
270MB	IDE	QULPS27ØA	12ms	3.5" 1"H	269	259
270MB	SCSI	QULPS27ØS	12ms	3.5" 1"H	279	379
340MB	IDE	QULPS34ØA	12ms	3.5" 1"H	279	299
340MB	SCSI	QULPS34ØS	12ms	3.5" 1"H	299	399
540MB	IDE	QULPS54ØA	12ms	3.5" 1"H	439	499
540MB	SCSI	QULPS54ØS	12ms	3.5" 1"H	439	539
1080MB	SCSI	QUEM1Ø8ØS	9ms	3.5" 1"H	779	879
1225MB	SCSI	QUPD1225S	10ms	3.5" HH	949	1,049
1800MB	SCSI	QUPD18ØØS	10ms	3.5" HH	999	1,099

NOTEBOOK COMPUTERS

NEC

Versa E 486 DX2 40 or 50MHz, 4MB RAM/Exp. to 20MB, 2 type II PCMCIA, MS-DOS 6.2, Windows 3.1, built-in trackball.
Color 250MB HD 40MHz NCV44Ø1531.....4,229
Color 340MB HD 50MHz NCV45Ø1541.....4,899
Color 340MB HD DX4/75.....5,199

TEXAS INSTRUMENTS

E-Series
200MB HD DX2/40 Color.....2,399
200MB HD DX2/50 Color.....2,729
200MB HD DX2/50 Active Color.....3,299
340MB HD DX4/75 Active Color.....3,999
455MB HD DX4/75 Active Color.....4,999
M-Series Multimedia
120MB HD SX/25 Mono.....1,999
120MB HD SX/25 Color.....2,349
200MB HD SX/25 Active Color.....3,179
340MB HD DX4/75 Active Color.....4,899
Portable CD-ROM Docking Station.....779

TOSHIBA

TI1910
486SX-33MHz, 4MB RAM/Exp. to 20MB PCMCIA Slot.
200MB Monochrome.....$1,489
200MB Color Dual Scan.....2,039
T1950
486DX2-40MHz, 4MB RAM/Exp. to 20MB PCMCIA Slot.
200MB, Color Dual Scan.....$2,679
200MB, Color, Active.....2,929
320MB, Color, Active.....3,179
T3400 Portege
120MB Active Color.....$3,349
120MB Active Color.....1,899
T4700
200MB Color Dual Scan.....3,159
320MB Dual Color Scan.....3,399
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- PC World, "Best Buy, Best Performance", December 1993

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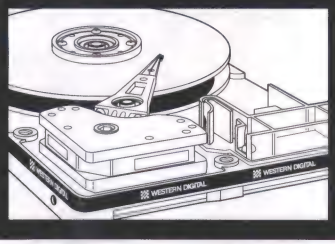

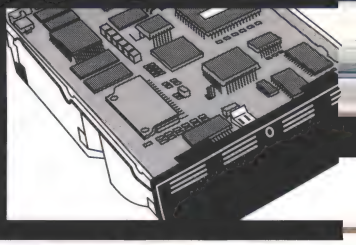

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540MB Drive, GSI-21, 250MB Tape, 2 tapes	$585
540MB Drive, Local Bus Cache card	$499
1Gig Drive, GSI-21 accelerator card	$759
1Gig Drive, GSI-21, 250MB Tape, 4 tapes	$899

SCSI DRIVE BUNDLES

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1Gig Drive, Local Bus Cache Card	$1039
1Gig Drive, 2Gig DAT, 1 tape	$1569
1Gig Drive, 32Bit Local Bus	$889
1.7Gig Drive, 16Bit ISA	$929
1.7Gig Drive, Local Bus Cache Card	$1149
1.7Gig Drive, 2Gig DAT, 1 tape	$1789
1.7Gig Drive, 32Bit Local Bus	$1099

WIDE SCSI BUNDLES

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2Gig Drive, 32Bit EISA, PCI or VLB card	$1969

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IDE Drive Bare 105 / 270	$239 / $409	SCSI Drive Bare 105 / 270	$279 / $429
with GSI-18 & 1 disk	$329 / $519	with Adaptec 1522 & 1 disk	$399 / $629
Portable external, attaches to		with Adaptec 1542 & 1 Disk	$529 / $759
printer port with 1 cartridge	$399 / $619	External for MacIntosh & 1 Disk	$399 / $629

gsi GSI drive accelerators increase the data transfer rate of your IDE drive 30 to 80%. Works by enabling the drives Read Multiple & Write Multiple commands to greatly increase performance. We highly recommend these products for WD, Conner, Quantum, Seagate, Micropolis, Maxtor, & Fujitsu.

	Alone	w/Drive
GSI-21 Board supports 2 IDE, 4 floppy drives. Doubles QIC-80 tape drive speed	$65	$55
GSI-18 Board supports 2 IDE drives. Works in conjunction with MFM, RLL, etc.	$55	$45
GSI-32 Board same as -21 adds 2 16550 serial ports & 1 bi-directional parallel port	$139	$119
GSI MaxIDEA Software solution works on existing IDE configuration (requires less than 1K of memory). Includes performance benchmark test.	$34	$25

HARD DRIVES

CONNER

IDE			
210MB	14ms	CFS210A	$202
340MB	13ms	CFA340A	$263
420MB	14ms	CFS420A	$275
541MB	12ms	CFA540A	$382
1060MB	9ms	CFP1060A	$749
SCSI			
1060MB	9ms	CFP1060S	$739

Maxtor

IDE			
245MB	15ms	7245A	$249
345MB	14ms	7345A	$259
540MB	12ms	7546A	$379

MICROPOLIS

IDE			
1050MB	10ms	MC4110A	$749
1740MB	10ms	MC2217A	$969
SCSI			
1052MB	8.5ms	MC4110	$749
1740MB	10ms	MC2217	$969
3020MB	11ms	MC1936	$1999
SCSI-AV Audio / Visual tuned drives			
1000MB	10ms	MC2210AV	$829
1700MB	10ms	MC2217AV	$1039
3000MB	11ms	MC1936AV	Call

Seagate

IDE			
213MB	16ms	ST3243A	$204
260MB	16ms	ST3290A	$219
341MB	13ms	ST3391A	$280
452MB	12ms	ST3550A	$295
SCSI (WIDE SCSI also available)			
1690MB	8ms	ST11950N	$1469
2145MB	8ms	ST12550N	$1639
2148MB	9ms	ST12400N	$1399

WESTERN DIGITAL

IDE			
270MB	12ms	AC1270	$229
341MB	12ms	AC2340	$259
425MB	12ms	AC2420	$275
540MB	11ms	AC2540	$379
730MB	10ms	AC2700	$559
1083MB	10ms	AC31000	$739

HARD DRIVES

Quantum

IDE			
170MB	14ms	LPS170A	$199
270MB	12ms	LPS270A	$229
342MB	12ms	LPS340A	$269
541MB	12ms	LPS540A	$379
SCSI			
170MB	14ms	LPS170S	$199
270MB	12ms	LPS270S	$245
342MB	12ms	LPS340S	$272
541MB	12ms	LPS540S	$399
1080MB	10ms	IMP1080	$739
1800MB	10ms	PD1800S	$939
2160MB	9.5ms	IMP2160S	Call

digital

2103MB	9ms	DSP3210	$1369
3500MB	11ms	DSP5350	$2469

IBM PS/1 PS/2 DRIVES

Complete solutions for your IBM. Larger sizes in stock!	170MB	270MB	340MB
PS/1 386 & 486	$229	$279	$319
PS/2			
25, 30, 30-286	$269	$329	$389
35 & 40	$219	$269	$309
50 thru 95 SCSI	$369	$439	$489
PS/2	210MB	420MB	540MB
50 thru 95 IDE	$419	$589	$719

CONTROLLER CARDS

	Alone	w/Drive
ADAPTEC		
A1522BASIC 16Bit SCSI	$129	$109
A1542CBASIC 16Bit SCSI	$225	$215
A2742 EISA SCSI	$389	$369
A2842 VESA SCSI	$319	$299
FUTURE DOMAIN		
1680SVP 16Bit SCSI	$155	$139
NexStor PCI SCSI	$169	$149
ALPHA RESEARCH CACHING CARDS		
S425I 16Bit IDE	$99	$89
S475I 32Bit Local Bus IDE	$139	$129
S485I 32Bit PCI IDE	$229	$219
S425S 16Bit SCSI	$229	$219
S475S 32Bit Local Bus SCSI	$369	$359

Many other types of controllers in stock.

CD ROM DRIVES

NEC	CDR900	4X	180ms	$979
NEC	CDR510	3X	195ms	$389
Toshiba	XM3401	2X	200ms	$319
Toshiba	XM4101	2X	320ms	$219
Sony	CDU561	2X	295ms	$289
Teac	CD50	2X	265ms	$259
Pioneer External CD Changers (300ms)				
DRM602X	6 disc		307KB/sec	$869
DRM604X	6 disc		612KB/sec	$1149
DRM1804X	18 disc		612KB/sec	$2059

MULTIMEDIA KITS

SCSI Drive, sound card (in retail pkg)
MV=Media Vision Pro Audio 16. MS=Media Vision Pro Studio 16
SB= Sound Blaster 16 SCSI. SA= Sound Blaster SCSI ASP.

	MV	MS	SB	SA
XM4101	$359	$389	$419	$459
CD50	$399	$429	$449	$489
CDU561	$429	$459	$469	$519
XM3401	$459	$489	$519	$559
CDR510	$509	$539	$579	$609
CDR900	$1119	$1149	$1159	$1199

CD ROM TOWERS

CD ROM Drive Towers - Multiple CD ROM drives in a single external enclosure. Great for networks, BBS, or business.

	2 Drive	4 Drive	7 Drive
XM4101	$579	$1259	$2249
CD50	$649	$1389	$2479
CDU561	$699	$1479	$2639
XM3401	$789	$1659	$2999
CDR510	$939	$1999	$3499
CDR900	$2119	$4339	$7489

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Free $25 ADI Photo CD processing coupon with each CD ROM Drive!
6 Title CD Bundle $69
Illustrated Encyclopedia, World Atlas, Mavis Beacon Teaches Typing, San Diego Zoo's Animals, US Atlas, Chessmaster 3000)
Caddies $5 Macintosh CD Driver $29
Altec Lansing ACS-100 Speakers $109

HARD DISK CARDS

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340MB	$359	540MB	$499

TAPE DRIVES

iOMEGA 250MB QIC-80 tape drives include 5YR warranty, software, 1 tape

	Alone	w/drive
Internal fits 3.5 or 5.25 bay	$159	$149
External for printer port	$319	$309

3 Pack of IOMEGA formatted DC2120 tapes $40 with any purchase!

SCSI Tape Drives

Kit is 16Bit card & 1 tape			Bare	Kit
750-1.5Gig	Exabyte	2501	$549	$739
2Gig	Conner	4320	$799	$969
2Gig	HP	35470	$929	$1049
4-8Gig	Conner	4324	$1119	$1329
4-8Gig	HP	35480	$1059	$1279
4-16Gig	Sony	SDT5000	$1099	$1299
4-16Gig	HP	C1533A	$1499	$1699

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128MB / 650MB / 1.3Gig $35 / $77 / $105

MISCELLANEOUS

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TEAC Floppy Drives		
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Floppy Combo 1.2 & 1.4	$115	$105
Maxtor 105MB PCMCIA drive		$429
PCMCIA to SCSI adapter		$319
Desktop Docking Module! Mounts in 5 1/4" drive bay. Allows you to use any PCMCIA in your desktop		$159

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The Spin Doctor for Interactive Movies

If you think you're tired of the words *virtual reality*, brace yourself for the attack of the phrase *interactive movie*. You'll be seeing it a lot over the next few years. Once in a while there's something exciting behind the catchphrase: a computer game where you play the leading role in an exciting, cinematic story, for instance. But not everyone agrees on how to win a digital Academy Award.

Should an interactive movie be totally indistinguishable from reality? Well, it would be fun to play the part of a tough detective, but a real detective can spend hours at the scene of a crime without finding anything amusing to do. The art of the interactive movie is to provide the illusion of free will while guiding you down the branching paths of a predetermined plot.

Finding the Right Viewpoint

Achieving the right balance is not easy. For instance, Dracula Unleashed provides convincing live-action sequences with real actors, but you can't interact much with those characters.

At the other extreme, virtual-reality maze games like Curse of the Catacomb bring you inside the action by letting you share the character's point of view. Instead of looking at a character, you *are* the character. You attack monsters or search for treasure and secret doorways. The illusion of free movement is exciting, but running around a maze like a rat gets old very fast.

Most movie games, such as Monkey Island or Indiana Jones and the Fate of Atlantis, have plenty of plot. You decide if you want Indy to pick up the statue or punch out the bad guy, and then he does. This is great for storytelling—especially when the action is intercut with spoken dialogue and preset narrative scenes—but looking over Indy's shoulder makes you feel more like a spectator than a participant. Moreover, up to now these games have used animation instead of live actors.

Creating exciting, believable characters who interact with the players is a tough challenge. Animated characters are not as convincing as live actors. And talking to game characters can be frustrating. You can't improvise; you have to choose a line of dialogue from a menu and then twiddle your thumbs while it appears as text—or is spoken by an actor.

The perfect interactive movie would combine the best of these techniques: live actors, a virtual-reality interface, spoken dialogue, a well-told and cinematic story, and freedom of action that makes you feel like you're truly taking part in an exciting adventure.

The Future Is Here

Do you have to wait until 2001 for such entertainment? Not if Access Software has anything to do with it. The company that gave us Amazon (one of my favorite PC games) is about to release Under a Killing Moon. I've played with a beta version, and it's incredibly cool. (Release is scheduled for mid-May.)

Access takes its direction as much from Hollywood as from Silicon Valley. "We were inspired by that Humphrey Bogart, Robert Mitchum–type character," says Chris Jones, Access's CEO, and codesigner (with Aaron Conners) of Under a Killing Moon. "If someone is a fan of those old movies, they're really going to enjoy this."

Access has developed what it calls a *virtual world*. "We wanted to create a world inside the computer that would seem as real as the world around you," explains Jones. "If there is a desk drawer across the room, you can walk over there, open it up, pull things out, and examine them."

As the detective star of Under a Killing Moon, you can look for clues and walk around in this Virtual World with total freedom.

If you think you recognize some of the faces in Killing Moon, you are right. Access hired well-known actors such as Margot Kidder and Brian Keith to bring the characters to life. The actors were shot against a blue screen, then their images were composited with backgrounds, one frame at a time.

Unfortunately, the slightly choppy frame rate spoils the effect a bit. "We're doing 10 frames per second," explains videographer Dave Brown. "It's a trade-off between frame rate and window size, and we're trying to give you the biggest picture we can." The action isn't as smooth as film's 24 or TV's 30 fps, but it's still convincing.

Delivered on three CDs, Killing Moon is probably the biggest computer game ever written. "It's 150 times bigger than Amazon," says Jones, "and that had ten floppy disks!" Worse yet, Killing Moon requires 4MB of RAM.

Technical problems aside, there's not

By Michael Goodwin

LOOK INSIDE THE PIANO. Investigate the vase. Saunter around the room looking for clues. Nothing is forbidden.

a doubt in my mind: This is the future of PC gaming, and the future starts today!

The Spin Doctor Is In

There are disadvantages to being an early bird when it comes to computer technology. I popped a CD ROM drive into my PC as soon as I saw one for sale. I got to play with the first CD ROM products, but I was also stuck with a primeval machine. As CD ROM games and infotainment software grew more demanding, I experienced stutter and delay as my drive struggled to keep up with them.

If this sounds familiar, you might follow my example and install one of NEC's new Triple-Spin CD ROM drives. It's close to a plug-and-play deal. Hardware installation is a snap: You simply slide out your old unit and whip in the new one—and, voilà, even the most sophisticated live-action games and data-heavy CDs ought to play perfectly. (If they don't, you may need to upgrade your CD ROM driver, as I did.)

Why the name Triple-Spin? Many CD ROM disks contain both binary computer files and CD audio tracks. CD audio requires a slower spin rate, and most older CD ROM drives are limited to that poky rotation. NEC's Triple-Spin unit handles audio perfectly, but when it encounters a binary file, it upshifts to deliver warp-speed data transfer.

I don't often review hardware, but since I'm planning to cover the latest (and most demanding) multimedia software in months to come, you'll need the hottest hardware to keep up with me. Right now, that looks like the Triple-Spin.

- Under a Killing Moon $99.95; Access Software; 800/800-4880
  Reader service no. 753
- Triple-Spin CD ROM reader 3Xi (internal) $500, 3Xe (external) $600, 3Xp (portable) $450; NEC; 800/632-4636
  Reader service no. 754

Michael Goodwin is a contributing editor for PC World. *He can be reached on PC World Online (see page 12 for information).* ■

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10-Second Windows

By Steve Bass

What if I told you I launch Windows every morning—with applications ready to go—in 10 seconds? And close them down just as quickly at the end of the day? Well, it's true, thanks to some little-known programs that get you up and running faster than a General Protection Fault can bring you back down again.

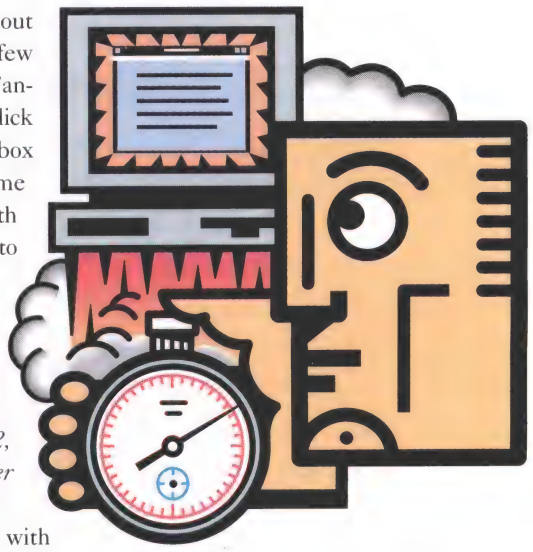
In the past, after Windows took its sweet time loading, I'd spend about five or six minutes manually calling up each application along with its accompanying data files. I tried to save a little time and automate the process by sticking the applications into Windows' StartUp group, but I still needed to open specific files manually. Unloading everything and saving files at the end of the day was equally tedious.

After some digging, I found three programs that help me get started fast. Each works by saving an image of your RAM to disk when you quit, then loading that image back into RAM when you start again. It's like inserting a bookmark into your computer.

This technique involves some sacrifice of disk space—8MB if you have 8MB of RAM, for example—but it's worth it. Each program does the job well, and I recommend any of them with just one proviso: You need a reasonably straightforward system. If you're like me and have lots of device drivers and a few TSRs, expect to spend some time tweaking your system. But it shouldn't be a really big deal. On my PC, for example, I removed the Stealth feature from Quarterdeck's QEMM memory manager and all was well.

Up and Running

The first program I tried was Binar Graphics' Fantastic Recall, a Windows-only auto-resume utility. It's also the cheapest one I found, about $31 discounted. It took a few tries, but once I installed Fantastic Recall I was able to click its Save and Exit dialog box and get to DOS in no time flat. The program comes with a handy uninstall batch file to clean up after itself—something I wish *every* Windows program would include. • *Fantastic Recall $49.95; Binar Graphics; 800/228-0666, 415/491-4182, 415/491-1164 (fax). Reader service no. 621*



Along the way I worked with PowerPro's Quick Restart. It's also cheap—about $40 on the street—and unlike Fantastic Recall it works in both DOS and Windows. The installation took me about half an hour—10 minutes installing and another 20 fine-tuning my CONFIG.SYS. When I was ready to leave Windows, a click on Quick Restart's Shutdown button saved the image. Then, with a flip of the Big Red Switch, I started the long commute to the family room for the nightly news. The next time I turned on my computer, Quick Restart loaded the saved image and popped up Windows where I left it the night before, mouse pointer and all. • *Quick Restart $59.95; PowerPro Software; 415/345-9278, 415/345-5128 (fax). Reader service no. 622*

The last program I tried was Engram's Stop&Go, which, at about $70 on the street, costs considerably more than the others. How come? Well, perhaps because Stop&Go is the only program that enables you to compress the RAM image, reducing the hard disk space requirement and speeding up the image file's reads and writes. Like Quick Restart, Stop&Go works with DOS and Windows.

You can also use Stop&Go with Engram's Card Kit, an add-in card with an uninterruptible power supply and surge suppressor built in. At the end of the day, just hit the computer's power switch and let the Card Kit save your image. While you won't see any speed difference when you save the image file, the kit makes Stop&Go even easier to use and provides a layer of protection in case of a power outage, all for a street price of about $200.

Saving Your Bacon

Speaking of protection, you can also use any of these programs to keep your data safe, although none of them do it as well as Engram's Card Kit. If one of your applications has an affinity for crashing and taking the system down with it, you might want to save an image file every so often for added security. • *Stop&Go $99.99, Stop&Go Card Kit $249.99; Engram Int'l; 800/995-0960, 415/455-1100, 415/455-1111 (fax). Reader service no. 623*

These products are all from low-profile companies, so finding them at discount prices will probably take some hard shopping. But to get in and out of Windows quickly, it's worth the search.

Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 12 for contact information).

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